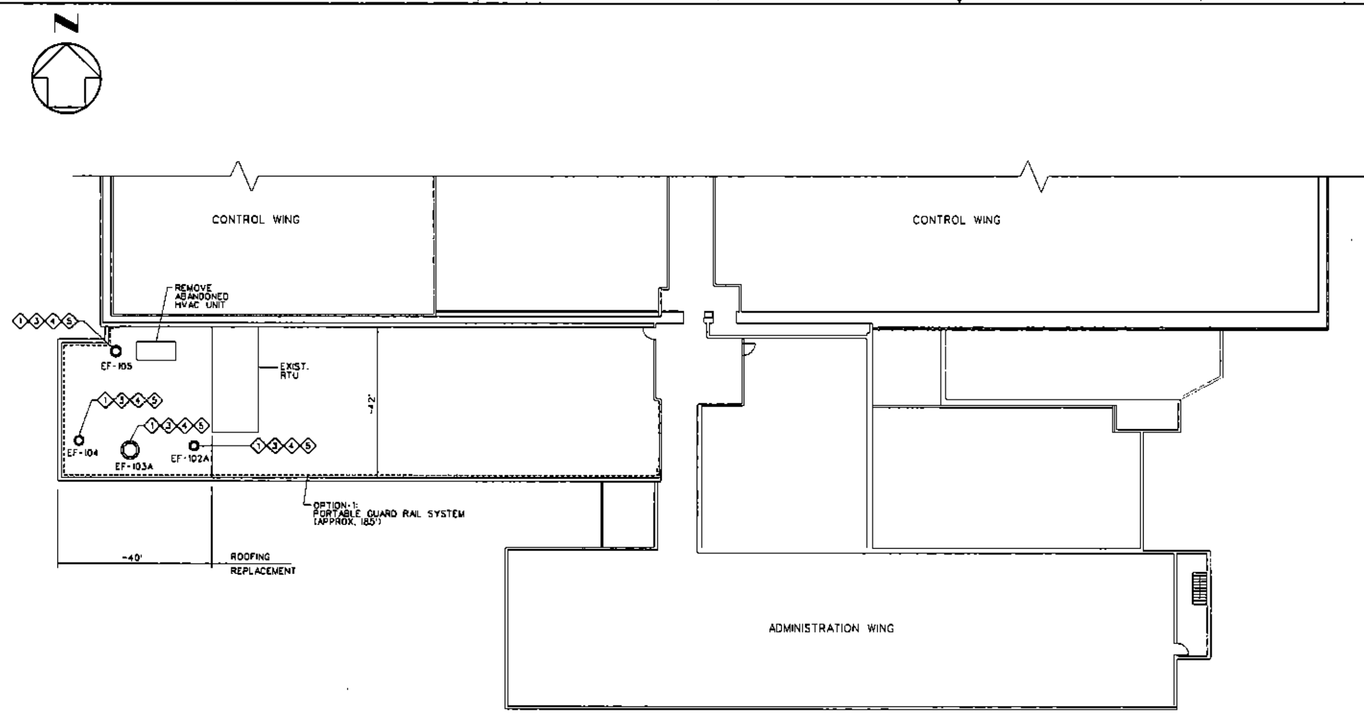
SIR/RFO DTRFAAC-12-R-04125

ATTACHMENTS
1 thru 6



PARTIAL ROOF PLAN - EXHAUST FAN REPLACEMENT

SCALE: 1/16" = 1'-0"

GENERAL NOTES:

1. ALL WORK, MATERIAL AND INSTALLATION SHALL CONFORM TO THE REQUIREMENT OF THE ORDINANCE AND CODES HAVING LEGAL JURISDICTION.
2. CONTRACTOR SHALL VERIFY ALL DEMOLITION WORK, EXISTING CONDITIONS, DIMENSIONS AND NEW INSTALLATION PRIOR TO COMMENCEMENT OF WORK.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR THE COMPLETE INTERLOCK CONTROL WIRING REQUIRED FOR PROPER SYSTEM FUNCTION AND OPERATIONS.
4. CONTRACTOR SHALL PROVIDE ALL REQUIRED ELECTRICAL CONDUITS, CABLES, CONDUCTORS AND WIRING MATERIAL FOR POWER WIRING PER NEC.
5. ALL WORK SHALL BE PERFORMED IN A NEAT ACCURATE, WORKMAN-LIKE AND PROFESSIONAL MANNER.
6. CONTRACTOR TO RE-USE EXISTING ELECTRICAL POWER SOURCES. PROVIDE ADDITIONAL CALBES, CONDUITS, DEVICES OR WIRING AS REQUIRED FOR A COMPLETE FUNCTIONAL AND OPERATIONAL SYSTEM.
7. REPAIR ANY ROOF DAMAGE ACCORDINGLY.

NEW WORK NOTES:

1. REPLACE EXISTING EXHAUST FAN AND CURB WITH NEW. PROVIDE ALLL REQUIRED FITTINGS AND ADAPTORS AS REQUIRED.
2. NOT USED
3. CONTRACTOR TO RECONNECT ALL REQUIRED GROUNDING/BONDING.
4. REPLACE ELECTRICAL WIRINGS/CABLES BACK TO PANEL WITH NEW.
5. REPLACE EXISTING DAMPER WITH NEW. IF FAN DOES NOT HAVE DAMPER, PROVIDE NEW DAMPER.

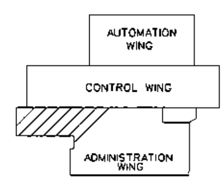
EXHAUST FAN SCHEDULE

MARK	LOCATION	SERVE ADMIN WING	TYPE CENTRIFUGAL	FLOWRATE CFM	S.P. (IN WG)	MOTOR (HP)	VOLTAGE (V/PHASE/HZ)	WINDINGS	FAN RPM	DRIVE	MOTOR RPM	BASED ON	NOTES
EF-102A	ADMIN WING ROOF	KITCHEN DISH WASHER	DOWNBLAST	500	1/4	1/4	120/1/60	1	953	BELT	1725	GREENHECK MODEL GB-091	(1), (3)
EF-103A	ADMIN WING ROOF	KITCHEN RANGE HOOD	2-SPEED UPBLAST	5000/3300	3/8	1.5	208/3/60	2	1409	BELT	1725/1140	GREENHECK MODEL CUBE-180	(1), (2), (3)
EF-104	ADMIN WING ROOF	KITCHEN TOILET	DOWNBLAST	300	1/4	1/6	120/1/60	1	1574	BELT	1725	GREENHECK MODEL GB-071	(1), (3)
EF-105	ADMIN WING ROOF	KITCHEN GRIDDLE	2-SPPED UPBLAST	2375/1580	3/8	3/4	208/3/60	2	1444	BELT	1725/1140	GREENHECK MODEL CUBE-141	(1), (2), (3)

(1) PROVIDE UNIT WITH DISCONNECT SWITCH, DAMPER AND BIRD SCREEN. PROVIDE TIE DOWN POINTS FOR SECURING THE FAN.
(2) PROVIDE UNIT WITH NON STICK WHEEL, CLEAN OUT PORT, DRAIN CONNECTION, GREASE TRAP WITH ABSORBENT MATERIAL, 2- SPEED CONTROLLER.
(3) REMOVE EXISTING ROOF CURB AND REPLACE WITH NEW.

LEGEND

— NEW WORK
— EXISTING



KEY PLAN

REV	APPROVED DATE	DESCRIPTION	JCN	REDLINE DATE	APVD

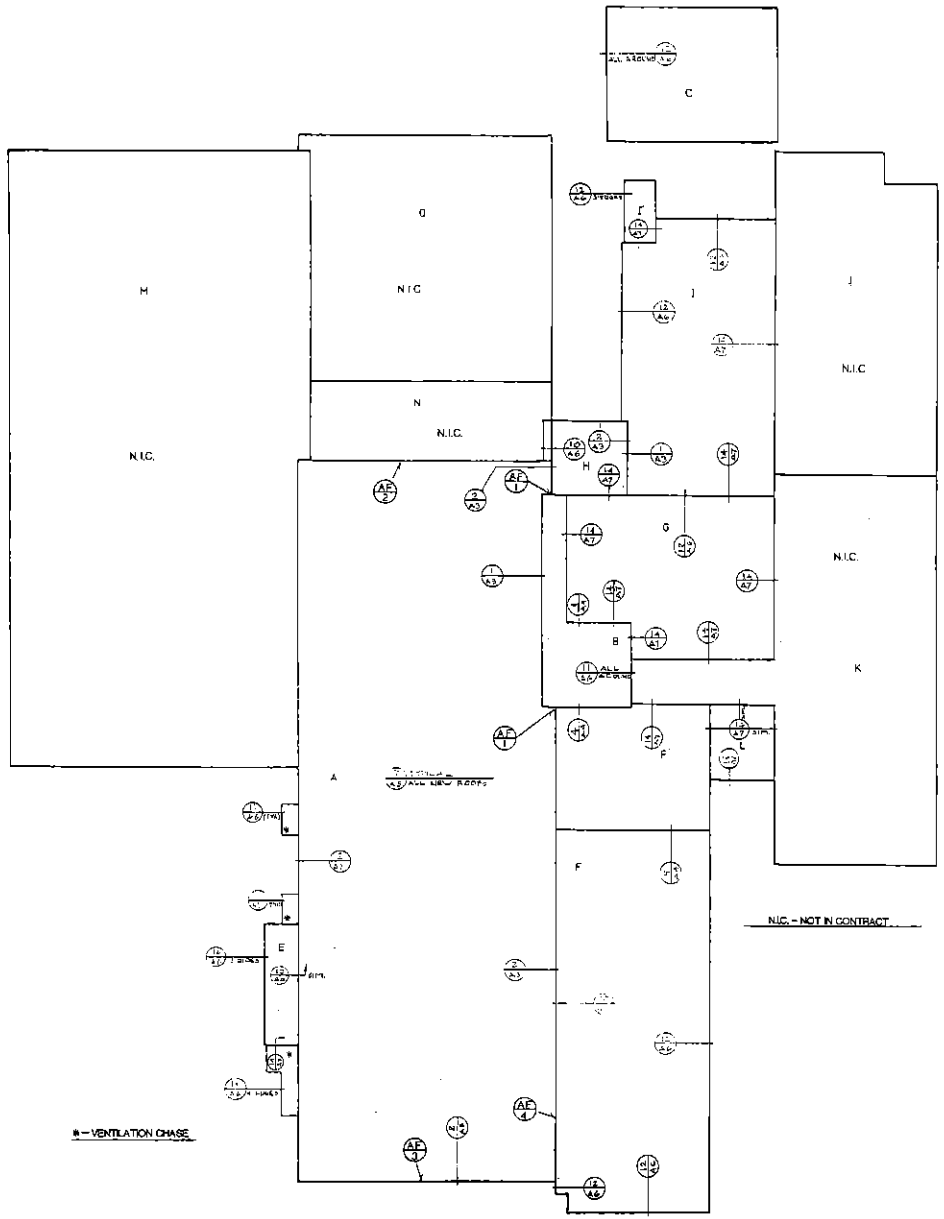
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
ATO - TECHNICAL OPERATIONS — CENTRAL SERVICE AREA

ARTCC
EXHAUST FAN & ROOFING REPLACEMENT
ADMINISTRATION WING KITCHEN AREA
PLAN, SCHEDULE AND NOTES

AURORA — IL

REVIEWED BY — SUBMITTED BY: WINNS CHUNG, PROJECT ENGINEER — APPROVED BY: DIETRICH FREIBANG, MGR. ENGINEERING - CHICAGO
DESIGNED VAC — DRAWN VAC — CHECKED VAC — ISSUED BY ENGINEERING SERVICES — DATE 09/20/2011 — JCN
DRAWING NO ZAU-D-ARTCC-M206 — REV

ISSUED FOR CONSTRUCTION



LEGEND

A - CONTROL WING
B - PENTHOUSE
C - OLD E/C BUILDING
D - MAINTENANCE GARAGE
E - HVAC DECK
F - CAFETERIA
G - SUPPLY AREA
H - LOADING DOCK
I - WOMENS LOCKER AREA
J - ADMINISTRATION WING EAST
K - ADMINISTRATION WING WEST
L - FOYER
M - AUTOMATION WING
N - EXP. WING PENTHOUSE
O - EXP. WING

AF/1 - INSTALL EXPAND-O-FLASH VERTICAL WALLEXPANSION JOINT AT CORNER

AF/2 - NEW EXPAND-O-FLASH EXPANSION JOINT COVER

AF/3 - NEW CONTINUOUS MILL COPING AND SEALED SPLICE PLATES

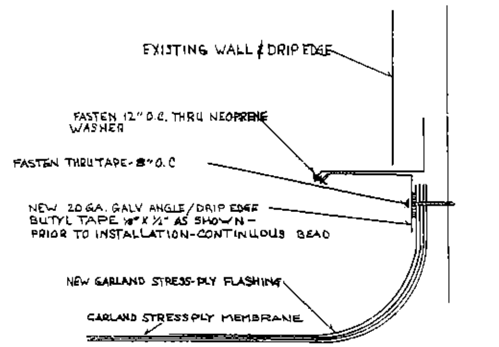
AF/4 - STRESS-PLY FLASHING SHALL EXTEND FROM 2" DOWN OUTSIDE WALL, OVER WOOD PLATES AND DOWN PARAPET WALL TO AMINIMUM 8" OUT ONTO HORIZONTAL ROOF MEMBRANE SURFACE, NAIL OFF VERTICAL FLASHING 6" O.C. USING SIMPLEX WITH 1" TINCAP, 6" LAPS.

NOTE : NO STORAGE OF EQUIPMENT OR MATERIALS WILL BE ALLOWED ON ANY N.I.C. ROOFS ATANY TIME DURING THE PROJECT

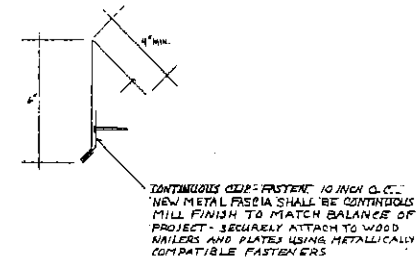
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
GREAT LAKES REGION — CHICAGO, ILLINOIS

AURORA ARTCC REROOF
ROOF PLAN
AURORA, ILLINOIS

APPROVED BY: Alan D. Falkenstein
DATE: JULY 5, 1988
AIRWAY FACILITIES DIVISION
DRAWING NO. GL-D-1207-A1



10 A1 METAL WALL BASE FLASHING
NTS

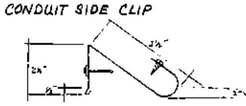


11 A1 CONCRETE DECK EDGE
NTS

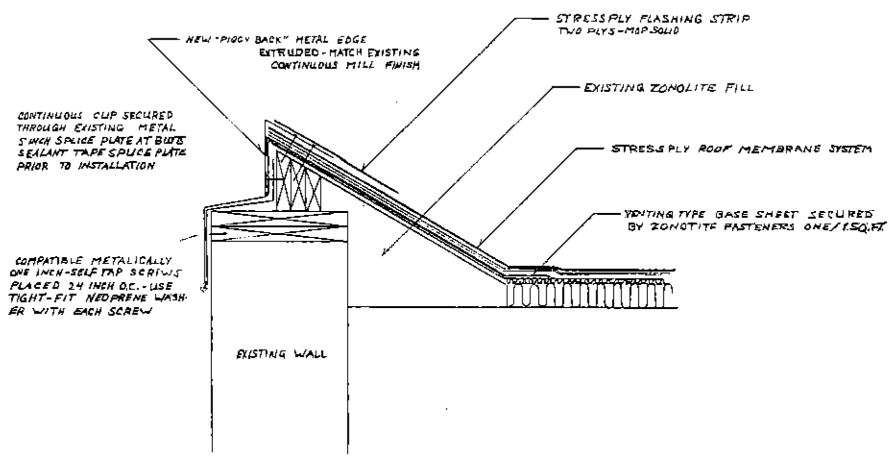
THOMPSON LIGHTNING ARRESTORS

REMOVE AND PRESERVE FOR REUSE ALL ARRESTORS AND COMPONENTS - RE-INSTALL AS PREVIOUS - USE NEW STAINLESS STL ONE INCH SCREWS AND NEOPRENE WASHERS TO SECURE TO VERTICAL OR SLOPED SURFACE ONLY

CONDUIT SIDE CLIP



CLIP SHALL MATCH NEW CONTINUOUS METAL IN LIKE AND KIND - CLIPS SHALL FIT TIGHT AND BE SOLIDLY SECURED TO EDGE METAL - USE NEOPRENE WASHERS WITH FASTENERS - ILL-FIT FASTENERS SHALL BE REMOVED AND REPLACED WITH NEW PROPER FIT UNITS



12 A1 NONPARAPET EDGE

REV.	DATE	DESCRIPTION	J.O. NO.	APPROVED

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
GREAT LAKES REGION — CHICAGO, ILLINOIS

AURORA ARTCC REROOF
ROOF DETAILS
AURORA, ILLINOIS

AIRWAY FACILITIES DIVISION
APPROVED BY: Alan D. Falkenstein
DATE: JULY 5, 1988
DRAWING NO. GL-D-1207-A6

Specifications
JANUARY 2012

ZAU FY-12
REPLACE KITCHEN ROOFING & EXHAUSTS

CHICAGO ARTCC
AURORA, ILLINOIS

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
GREAT LAKES REGION

TABLE OF CONTENTS

END OF TABLE OF CONTENTS

SECTION 011000 – GENERAL REQUIREMENTS

PART 1 – GENERAL

1.1 SUMMARY

A. Scope of Work: These specifications, together with the referenced specifications, standards, and drawings specified in the contract documents, cover the requirements for the ZAU FY-12 Replace Kitchen Roofing and Exhausts project in the Administration Wing at the Chicago Air Route Traffic Control Center (ARTCC) located in Aurora, Illinois.

Work includes, but is not limited to, the following:

1. Replace roofing system over the kitchen area in the Administration Wing of nominal dimensions 40' x 42'per drawing ZAU-D-ARTCC-M206 and reference drawings GL-D-1207-A1 and –A6, including removal of the existing roofing membrane and insulation, and installation of an 80 mil, mechanically-attached roofing membrane with insulation, flashings, counter flashings, sealants, adhesives and related components.
2. Provide roof anchor restraints and walkway pads.
3. Provide new metal decking at abandoned roof openings.
4. Replace Administration Wing kitchen roof exhaust fans EF-102A, EF-103A, EF-104 & EF-105 and curbs with new equipment and curbs.
5. Replace existing electrical cables and wiring from fans EF-102A through EF-105 to panel with new material.
6. Provide required grounding for all exhaust fans.
7. Provide new dampers for all exhaust fans EF-102A through EF-105.
8. Other work as required on drawing ZAU-D-ARTCC-M206 and in the specifications.
9. Bid Option – 1: Provide Portable Guard Rail System complete with lightning protection bonding jumpers.
10. Bid Option – 2: Provide one (1) base lifter/mover for Portable Guard Rail System.

B. Existing Facility Operations: The ARTCC is a 24-hour, 7-day-per-week operating facility occupied by Air Traffic and Airway Facilities personnel. It will be necessary for the Contractor to schedule and plan all work and coordinate all work with the Contracting Officer's Technical Representative (COTR) so that normal facility operations may continue with minimum disruption or interference.

C. Intent of Specifications: All material, labor and equipment required to perform the work shall be furnished by the Contractor. All work shall be accomplished by experienced workers in accordance with the highest standards of the various work trades involved. All work performed and all materials and equipment used shall be approved by the COTR. This shall include, but not be limited to, testing, inspection, scheduling, reporting, and submittals.

Contract Documents: The work shall be in accordance with the lines and grades shown on the contract drawing(s). The Contractor shall not use dimensions scaled from drawing(s). All dimensions shown on the drawing(s) shall be verified by the Contractor by actual measurements in

the field. The drawing(s) form a part to this specification and are applicable to the extent specified herein. If any conflict exists between the drawing(s) and the specifications, the specifications shall govern.

D. Inspection of Site by Contractor: Bidders shall visit the site to familiarize themselves with existing site conditions and carefully examine the areas in question as to conditions that may affect proper execution of the work. Failure to do so will be unacceptable justification for additional charges due to unknown site conditions. No claim for the extra cost will be allowed due to lack of full knowledge of the existing conditions.

1. Coordination: All contacts and coordination between the Contractor and the FAA shall be through the COTR. Coordination with the COTR will be necessary throughout the work process. Note: The COTR is also referred to as the Contracting Officer Representative (COR) or the Resident Engineer (RE).

2. Preconstruction Conference: The Contractor shall attend a preconstruction conference with the FAA COTR and FAA personnel, arranged by the Contracting Officer and including review of Form 3900-8 FAA PRE-CONSTRUCTION AND MAINTENANCE PROJECT SAFETY AND HEALTH CHECKLIST. The Contractor shall abide by all agreements reached at the conference regarding safety practices, ingress and egress routes to the construction site, work schedule, security and general operating procedures.

E. Compliance with Local Codes and Other Codes: The Contractor shall comply with all local and other codes of the standard trade practices adopted by these contract documents. Where the requirements of the specifications and drawings exceed those of the local and adopted codes, the Contractor shall comply with the requirements of the specification and drawings.

Local Permits: The Contractor shall apply, pay fees, etc., to obtain local building permits and inspections as required. All permits necessary to comply with state and federal regulations pertaining to disposal are the Contractor's responsibility.

F. Materials: The Contractor shall provide all materials, equipment, and labor necessary to complete the project. Materials and equipment incorporated into the work shall conform to applicable specifications and standards or as specifically approved in writing by the COTR. Do not use material or equipment for any purpose other than for which it is designed or is specified.

NOTE: THE USE OF BRAND NAMES OR THE IDENTIFICATION OF SPECIFIC PRODUCT SOURCES IN THIS SOLICITATION DOES NOT CONSTITUTE A REQUIREMENT THAT ONLY THOSE BRAND NAME PRODUCTS MEET THE CONTRACT SPECIFICATIONS OR THAT ANY PRODUCT SOURCES MUST BE USED (UNLESS SPECIFICALLY STATED). BRAND NAME IDENTIFICATION IS INTENDED TO SERVE AS AN ILLUSTRATION OF THE STANDARD OR TO IDENTIFY KNOWN ACCEPTABLE SOURCE(S) OR PRODUCT(S).

Workmanship: All work shall be accomplished by workers experienced in each trade in accordance with the highest standards of the various trades involved. The Contractor is required to have a minimum of five (5) years experience, for the applicable installation. All details shall be approved by the COTR to assure a professional, complete project, whether stated in the specifications or not.

Warranties: The Contractor shall provide one-year product workmanship warranty.

G. Submittals: Unless otherwise specified, the Contractor shall submit for approval samples of each material to be used, mix or test required, including six (6) copies of each component's manufacturers literature and applicable MSDS sheets. This is to include (but is not limited to) applicable product literature, sample guarantee and other data as required by other sections of the

specifications. Deviations from these specifications shall be submitted in writing to the COTR for approval by the Project Engineer.

Unless otherwise specified, the Contractor shall submit three (3) copies of Operation and Maintenance (O&M) manuals for equipment in final form at least 30 days before completion of the project. The manuals shall include information for each unit of equipment installed. Prepare operation and maintenance manuals as follows: heavy-duty, commercial-quality binders, minimum 8-1/2-by-11 inch, 20-lb/sq. ft. white bond paper, with dividers, text material (manufacturer's standard printed material) and drawings. Include information for each unit of equipment and include a copy of each warranty, bond, or service contract. See individual specification sections for additional requirements.

H. Construction Limits and Access: The Contractor shall confine operations, activities, storage of materials, and employee parking within the designated areas, as directed by the COTR. Any additional area needed shall be obtained off site, at no additional cost to the FAA.

1. Access for the Contractor, subcontractors, employees, deliveries, etc., will be in the location as directed by the COTR. Access to the construction site shall be kept unobstructed. If temporary access obstruction is unavoidable, the Contractor shall advise the COTR immediately. Temporary roadways and/or other access may be authorized only by the COTR. Obstruction of existing roadways, driveways, etc., to the ARTCC, except where indicated on the drawings, is strictly prohibited.
2. After the Notice to Proceed and prior to commencement of construction, the Contractor and COTR shall conduct joint inspections of areas affected by construction to confirm existing conditions.

J. Contractor's Use of Premises:

1. The Contractor shall have complete use of the premises within the construction limits for the execution of the work with the following exceptions:
   a) Airway Facilities personnel performing routine or emergency maintenance activities which require access within the construction limits have priority over the Contractor's operations.
   b) Other Contractors, employed by the FAA, that are working at the ARTCC.
2. The Contractor shall assume full responsibility for the protection and safekeeping of products stored on the site.
3. The Contractor and his subcontractors shall maintain the job site in a neat and orderly condition. This includes the daily removal of rubbish, waste and tools, equipment and materials not required for the work in progress.
4. It shall be the Contractor's responsibility to remove and haul any demolition and waste materials to a legal off-site disposal facility.

K. Working Conditions: No work shall be performed by the Contractor without consent of the FAA's Contracting Officer's Technical Representative.

1. Statement of Work Hours: The Contractor shall furnish a statement to the Contracting Officer or COTR for approval at the preconstruction conference indicating the work schedule, including hours and days per week to be worked and approximate number of persons to be employed on the job for the "normal" work shift before commencing construction. Notify the COTR in advance of any changes in the work hours or the days per week to be worked.

   No work shall be performed on Saturdays, Sundays, or Federal holiday. Hours of work shall be from 7:30 a.m. to 4:30 p.m. or as approved by the COTR.

2. Notification of Planned Overtime Work: In the event the Contractor intends to work overtime, weekends, or holidays, he shall obtain the COTR's approval at least 48 hours in advance of his commencement of the overtime work, and 48 hours prior to weekend or holiday work.
3. Work Safety: The Contractor shall be responsible for safety on the work site. It is the responsibility of the Contractor to eliminate hazards which may result in tripping, electrical shock, fire, falling objects, environmental hazards, vehicular accidents, etc. The Contractor shall comply with all safety precautions required by OSHA. The Contractor shall furnish and install barricades, obstruction markers, and warning signs as required and instructed by the Contracting Officer's Technical Representative.
4. Shutdowns, cutovers, and hot taps of environmental and electrical systems shall be accomplished between the hours of 9:00 p.m. and 5:00 a.m. All preparatory work shall be completed prior to shutdown/cutover to minimize downtime. Shutdown, cutovers, and hot taps shall be coordinated with the COTR a minimum of 48 hours in advance when the activity is scheduled for a normal working day, and 72 hours in advance when the activity is scheduled for a weekend or holiday. Time of work shall be subject to Air Traffic and Airway Facilities approval.

L. Security Requirements:

1. Contractor's Personnel: Contractor shall provide the COTR with a list of the Contractor's personnel who will require access to the ARTCC premises. The list shall be kept current during project work.
2. Contractor's personnel will be subject to security investigations by FAA. The Contractor shall promptly complete for each employee such security forms as are furnished by the Contracting Officer's Technical Representative.
3. The ARTCC facility is under security guard at all times. All personnel entering the facility will be required to show a visitor's badge, issued by the security guard on a daily basis. The security badge must be worn at all times while on the premises. Instructions regarding security requirements will be furnished at the time the badges are issued.
4. Work shall be arranged so that the Contractor's personnel can be escorted, when required by the FAA, in certain areas which are considered to be classified. Contractor's personnel shall not violate any security regulations pertaining to the ARTCC facility. Violators may be removed from the premises with the right to reenter revocable. Contractor's day-to day work schedules in the classified areas shall be arranged to allow for minimum escort.
   a) Identification Decals: Vehicle identification cards shall be furnished by the Contractor and issued to employees for access to the site. The cards shall be displayed on the left-hand side of the windshield of the vehicle at all times when the vehicle is on the site. The Contractor shall be responsible for the collection and surrendering of all vehicle cards which are no longer required.

      The FAA reserves the right to collect the cards from any person who has been removed from the premises due to conduct or other violations.

      1.) Card Description. "**ZAU**", a minimum of 3" high, shall be printed on a 5" x 8" card. Letters shall be blue with white background.

      2.) Right to Search. Current procedures at FAA facilities include the "right to search." If, in the judgment of the FAA security guard, a cause to search a vehicle or the person or personnel exists, such a search will be made.

M. Temporary Facilities:

1. Temporary Water: The existing building water system may be used for construction purposes at no cost to the Contractor. Cold water only is available. The Contractor shall obtain location connections from the Contracting Officer's Technical Representative. The Contractor shall extend the system as necessary to comply with temporary water requirements. Extension from the point of connection, including equipment, operation, and maintenance shall be paid for by the Contractor.
2. Temporary Electrical Power: The Contractor shall be responsible for all connections and costs for obtaining temporary electrical power from the local power company. Connection to the existing ARTCC facility electrical system at any other point is prohibited. Coordinate with the Contracting Officer's Technical Representative.

   The Contractor shall provide all supply lines for light and power, extension outlets, extension cords, trailers, receptacles, bulbs, fuses, and other equipment required for safety, for proper execution of the work, and for inspection purposes.
3. Temporary Telephone: The Contractor shall provide his own telephone service.
4. Temporary Construction Aids: The Contractor shall furnish, install, and maintain required construction aids and equipment to facilitate execution of work, including scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes, protective barriers, etc. Remove on completion of work.
5. Restrooms: The Contractor's employees may be allowed to use the ARTCC facility's restrooms as directed by the COTR. If not available, the Contractor will be responsible to provide temporary toilet facilities for his workmen. Temporary toilet facilities shall be of the type approved by the local governing body. The location of the toilet facilities shall be as directed by the COTR.
6. Removal of Temporary Facilities: The Contractor shall promptly remove all temporary facilities from premises at end of work. If the Contractor fails to do so within a reasonable time after notification, the COTR will have the items removed at the Contractor's expense.

N. Cleaning:

1. Working Area: The Contractor shall keep the working area in a clean and proper condition at all times. All rubbish and waste resulting from the execution of work shall be removed at the end of each day, or as directed by the COTR. Dumpster or similar containers shall be provided by the Contractor at no additional cost to the FAA.
2. Waste Packing Material: Immediately after unpacking all packing material, case lumber, excelsior or rubbish, flammable or otherwise, remove to the proper location.
3. Final Cleanup: Upon completion of work and before final acceptance by the FAA, the Contractor shall remove his/her working tools, equipment, debris, rubbish, and unused materials from the construction site.

O. Contractor's Liability: Damage to the existing facility or equipment caused by the Contractor shall be immediately reported to the COTR. The Contractor shall be responsible for repairing or having repaired damaged areas of the facility structure or equipment caused by the Contractor or his/her employees. All repairs shall be accomplished at the Contractor's expense without delay and to the satisfaction of the COTR.

1. Protection of Existing Utilities: It shall be the Contractor's responsibility to assure that locations of all underground cables, pipes, conduits and utility lines are established before beginning excavation work. Any damage to cables and utility lines shall be promptly repaired at the Contractor's expense to the complete satisfaction of owners of such lines and cables.

The Federal Aviation Administration will field establish the approximate locations of its own cables. Coordinate with the COTR before beginning demolition activities.

2. Requirements Included: It shall be the Contractor's responsibility to provide protection of work from weather, physical damage, improper use, and other adverse natural conditions.
3. It shall be the responsibility of the Contractor to replace any damaged work including finishes, material and equipment.

PART 2 – PRODUCTS

2.1 PROHIBITED MATERIALS

A. Building materials and all other facility components shall not contain asbestos.

B. Painted surfaces shall not contain lead.

C. Potable water plumbing and associated fixtures shall not contain lead above the 0.2% lead level established by the Safe Drinking Water Act and other pertinent regulations.

D. Oil filled equipment and items shall not contain PCB's.

E. Fire extinguishing media shall not contain Halon.

PART 3 – EXECUTION (NOT USED)

END OF SECTION 011000

SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

1.2 QUALITY ASSURANCE

A. Existing Utilities: Maintain existing utilities indicated to remain in service and protect them against damage during cutting or demolition operations.

B. Structural and Operational Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety. Operating elements include the following:
   1. Fire-suppression systems.
   2. Mechanical systems piping and ducts.
   3. Control systems.
   4. Communication systems.
   5. Electrical wiring systems.

C. Cutting and Patching Conference: Before proceeding, coordinate with the Contracting Officer's Technical Representative (COTR) to review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Patching Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed. Proceed with cutting and patching only after unsafe or unsatisfactory conditions have been corrected and contractor methods approved by the COTR.

B. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, notify the COTR before proceeding with Work.

C. Verify that utilities have been disconnected and capped.

3.2 PREPARATION

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

B. Removal of Existing Utility Services: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

C. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during cutting or demolition operations to the satisfaction of the COTR.

D. Exterior Demolition: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

3.3 PERFORMANCE

A. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, using methods least likely to damage elements retained or adjoining construction. All cutting methods must be approved by the COTR.

B. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide U.L. rated firestopping systems at firewall penetrations. All materials and firestopping systems shall be approved by the COTR.

1. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

a. Clean piping, conduit, and similar features before applying paint or other finishing materials.

b. Restore damaged pipe covering to its original condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

E. Dispose of demolished items and materials promptly. Do not allow demolished materials to accumulate on-site. Comply with requirements in Division 1, Section 011000.

END OF SECTION 017329

SECTION 07543 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Scope of Work: The Contractor shall remove the existing roofing system down to the metal deck and install a new mechanically-fastened TPO membrane roofing system, including vapor retarder and insulation on the existing kitchen roof. See drawing ZAU-D-ARTCC-M206, reference drawings- GL-D-1207-A1 and –A6, the "DETAIL 1 – Roof / Wall Flashing" and the "TPO ROOF DETAIL" at the end of this specification.

The kitchen re- roofing work includes the installation of anchor restraints and walkway pads.

B. Verify that existing metal decks are in acceptable condition to receive new roofing system and replace or repair any portions found unsuitable.

C. Coordinate roofing installation with existing conditions.

1.2 DEFINITIONS

A. TPO: Thermoplastic polyolefin.

B. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.

C. FM Approvals Listing: Provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
1. Fire/Windstorm Classification: Class 1A-135.
2. Hail Resistance: SH.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.
1. Adhesives: Provide VOC documentation.

B. Shop Drawings: For roofing systems. Include plans, elevations, sections, details, and attachments to other work.
1. Base flashings and membrane terminations.
2. Tapered insulation, including slopes.
3. Roof plan showing orientation of steel roof deck and orientation of membrane roofing and fastening spacings and patterns for mechanically fastened membrane roofing.
4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

C. Qualification Data: For qualified Installer, manufacturer and inspector.

D. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing systems comply with requirements specified in "Performance Requirements" Article.
   1. Submit evidence of compliance with performance requirements.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.

F. Research/Evaluation Reports: For components of membrane roofing system, from the ICC-ES.

G. Field quality-control reports.

H. Maintenance Data: For roofing system to include in maintenance manuals.

I. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is UL listed and FM Approvals approved for membrane roofing system identical to that used for this Project.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

C. Inspector Qualifications: Provide qualifications of a roofing consultant who shall be responsible for field quality control. Inspector shall be an independent testing and field quality control professional with a minimum 5 years experience in similar project size, complexity and system to conduct testing indicated.

D. Source Limitations: Obtain components including roof insulation and fasteners for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.

E. Exterior Fire-Test Exposure: ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

F. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

G. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.
   1. Meet with FAA, Contracting Officer's Technical Representative (COTR), Government's insurer if applicable, testing and inspecting agency representative, roofing installer, roofing system manufacturer's representative and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
   2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review structural loading limitations of roof deck during and after roofing and review deck substrate requirements for conditions and finishes, including flatness and fastening.
   5. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
   6. Review governing regulations and requirements for insurance and certificates if applicable.
   7. Review temporary protection requirements for roofing system during and after installation.

8. Review roof observation and repair procedures after roofing installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof board materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes membrane roofing, base flashings, cover boards, fasteners, roofing accessories, and other components of membrane roofing system.
2. Warranty for roofing system shall be a no dollar limit for labor and materials.
3. Warranty Period: The roof system shall have a warranty for peak wind gusts of 100 mph and shall be guaranteed against defects by the manufacturer and be leak free for a period of 20 years after completion. This warranty shall identify the FAA as owner of the facility. The location and effective starting date of warranty shall be indicated. (The warranty shall be without any financial limitation in case of roof replacement).

B. Puncture Resistance Warranty: In addition to Special Warranty, Contractor agrees to repair and replace all or part of components of membrane roofing system caused by accidental punctures. Provide a no dollar limit, 20-year warranty.

C. One-Year Warranty Inspection: As part of the one-year warranty inspection, the COTR will conduct an infrared roof survey on any project involving a membrane roofing system. This survey will be conducted in accordance with ASTM C 1153. The Contractor shall be required to replace all damaged materials and to locate and repair sources of moisture penetration, at no additional cost to the FAA.

PART 2 - PRODUCTS

2.1 TPO MEMBRANE ROOFING

A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878, internally fabric or scrim reinforced, uniform, flexible TPO sheet.

1. Manufacturers: Subject to compliance with requirements, provide products by Stevens Roofing Systems; Division of JPS Elastomerics. Other available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Carlisle SynTec Incorporated.
2. Thickness: 80 mils, nominal with a minimum of 34 mils above scrim.
3. Exposed Face Color: White.

2.2 AUXILIARY MEMBRANE ROOFING MATERIALS

A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, 45 mils thick, minimum, of same color as sheet membrane. Use 60 mil thick unreinforced thermoplastic polyolefin sheet flashing at parapet, same color as sheet membrane.

C. Bonding Adhesive: Manufacturer's standard, low-VOC adhesive as confirmed by COTR.

D. Slip Sheet: Manufacturer's standard, of thickness required for application.

E. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inchthick; with anchors.

F. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick prepunched.

G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.3 SUBSTRATE BOARDS

A. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, Type X, 5/8 inchthick.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Georgia-Pacific Corporation; Dens Deck.
2. Substrate boards shall be placed directly on metal deck with fasteners.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

2.4 PROTECTION BOARDS

A. Protection Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, Type X, 1/2 inchthick.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Georgia-Pacific Corporation; Dens Deck.
2. Protection boards shall be placed on top of existing roof system. Roof membrane shall be placed directly on protection board forming roof assembly.

2.5 VAPOR RETARDER

A. Polyethylene Film: ASTM D 4397, 6 milsthick, minimum, with maximum permeance rating of 0.13 perm.

1. Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.6 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by TPO membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation.

B. Composite Polyisocyanurate Board Insulation: ASTM C 1289, with factory-applied facing board on one major surface, as indicated below by type, and felt or glass-fiber mat facer on the other.

1. Type V, OSB facer, 7/16 inchthick

C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.7 INSULATION ACCESSORIES

A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

2.8 ANCHOR RESTRAINTS

A. Roof Anchor Restraints: Provide fall protection anchor points for permanent application, suitable for attachment to the existing roof construction.

1. Manufacturers: Provide the following: CB-12 Series Anchors, by Guardian Fall Protection of Kent, Washington, or approved equal.
2. Anchors shall consist of round 12"-high galvanized steel post welded to a galvanized steel baseplate.
3. Anchors shall be designed to provide attachment for up to 4 workers each and shall be capable of withstanding a 5,000 lbs. static load.

2.9 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick, and acceptable to membrane roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

D. Close all fresh air intakes/louvers where dust and odors from the roofing activities could enter the building.

E. Coordinate with the COTR the timing of the roofing removals and installation activities with the least potential for disruption of building operations.

3.3 SUBSTRATE BOARD

A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together. See 'TPO ROOF DETAIL' at the end of this section.

1. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.

2. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions

3.4 PROTECTION BOARD

A. Install board over insulation with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together. See 'TPO ROOF DETAIL' at the end of this section.

3.5 VAPOR-RETARDER INSTALLATION

A. Polyethylene Film: Loosely lay polyethylene-film vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of 2 inchesand 6 inches, respectively.

1. Continuously seal side and end laps with tape.

B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.

C. Coordinate with roofing manufacturer location of vapor retarder.

3.6 INSULATION INSTALLATION

A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday. See 'TPO ROOF DETAIL' at the end of this section.

B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Install insulation under area of roofing to achieve required thickness (minimum 2 inches). Maximize thickness of insulation to match existing roof lines and slopes for proper drainage. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inchesin each direction.

1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.

D. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

E. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inchwith insulation.

1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

F. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.

2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

G. Install slip sheet over insulation and immediately beneath membrane roofing.

3.7 MECHANICALLY FASTENED MEMBRANE ROOFING INSTALLATION

A. Mechanically fasten membrane roofing over area to receive roofing and install according to roofing system manufacturer's written instructions. See 'TPO ROOF DETAIL' at the end of this section.

1. For in-splice attachment, install membranes roofing with long dimension perpendicular to steel roof deck flutes.

B. Start installation of membrane roofing in presence of roofing system manufacturer's technical personnel.

C. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Mechanically fasten or adhere membrane roofing securely at terminations, penetrations, and perimeter of roofing.

E. Apply membrane roofing with side laps shingled with slope of roof deck where possible.

F. In-Seam Attachment: Secure one edge of TPO sheet using fastening plates or metal battens centered within membrane seam and mechanically fasten TPO sheet to existing roof/deck.

G. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements

H. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.

I. Install membrane roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition.

3.8 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.9 ROOF ANCHOR INSTALLATION

A. Roof Anchor Restraints: Install roof anchors on the roof per the anchor system manufacturer's recommendations.

1. Kitchen Roof: Install one (1) anchor in the center of the re-roofing area. Coordinate final location of anchor with the COTR.
2. Fasten anchor baseplates to the metal roof deck with steel screws per manufacturer's recommendations.

3.10 WALKWAY INSTALLATION

A. Flexible Walkways: Replace walkway products along rooftop unit and for all roof appurtenances such as drains, exhausts, etc. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.11 FIELD QUALITY CONTROL

A. Installation Inspections: Engage a full-time field quality control inspector during roof system installation. The field quality control inspector shall submit inspection report at weekly intervals to Contractor and COTR and coordinate with roofing system manufacturer's technical personnel and inspect roofing installation upon completion.

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

C. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

D. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements

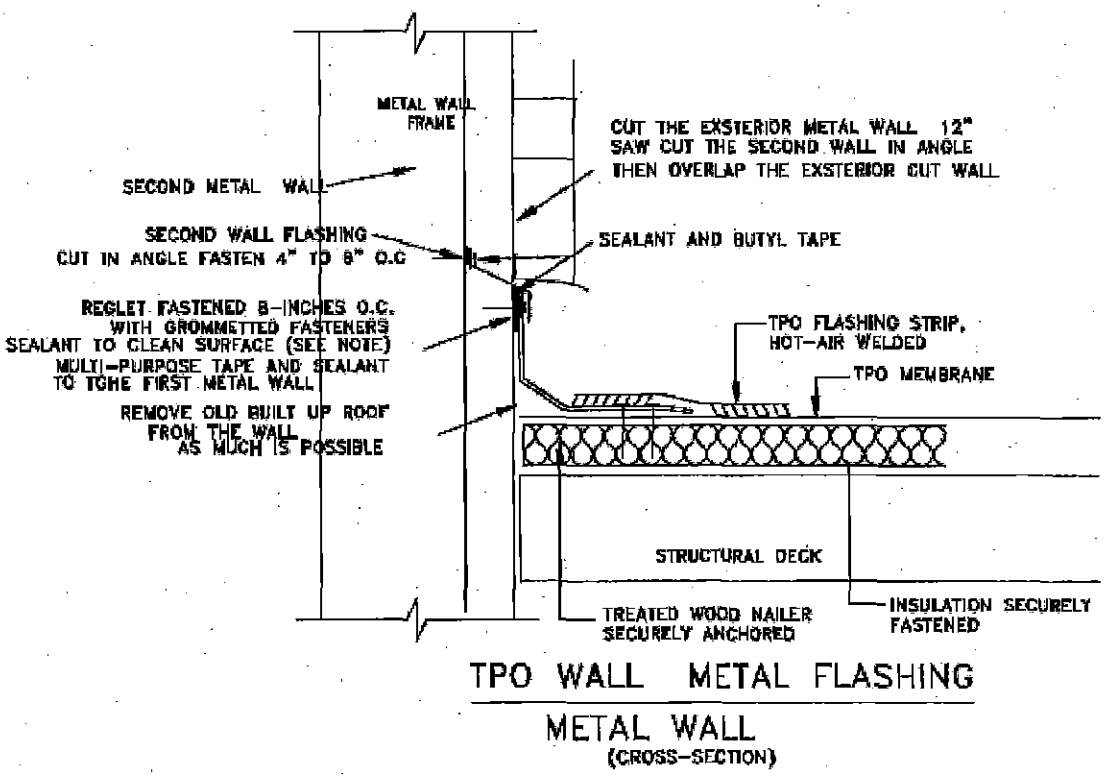
3.12 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to COTR.

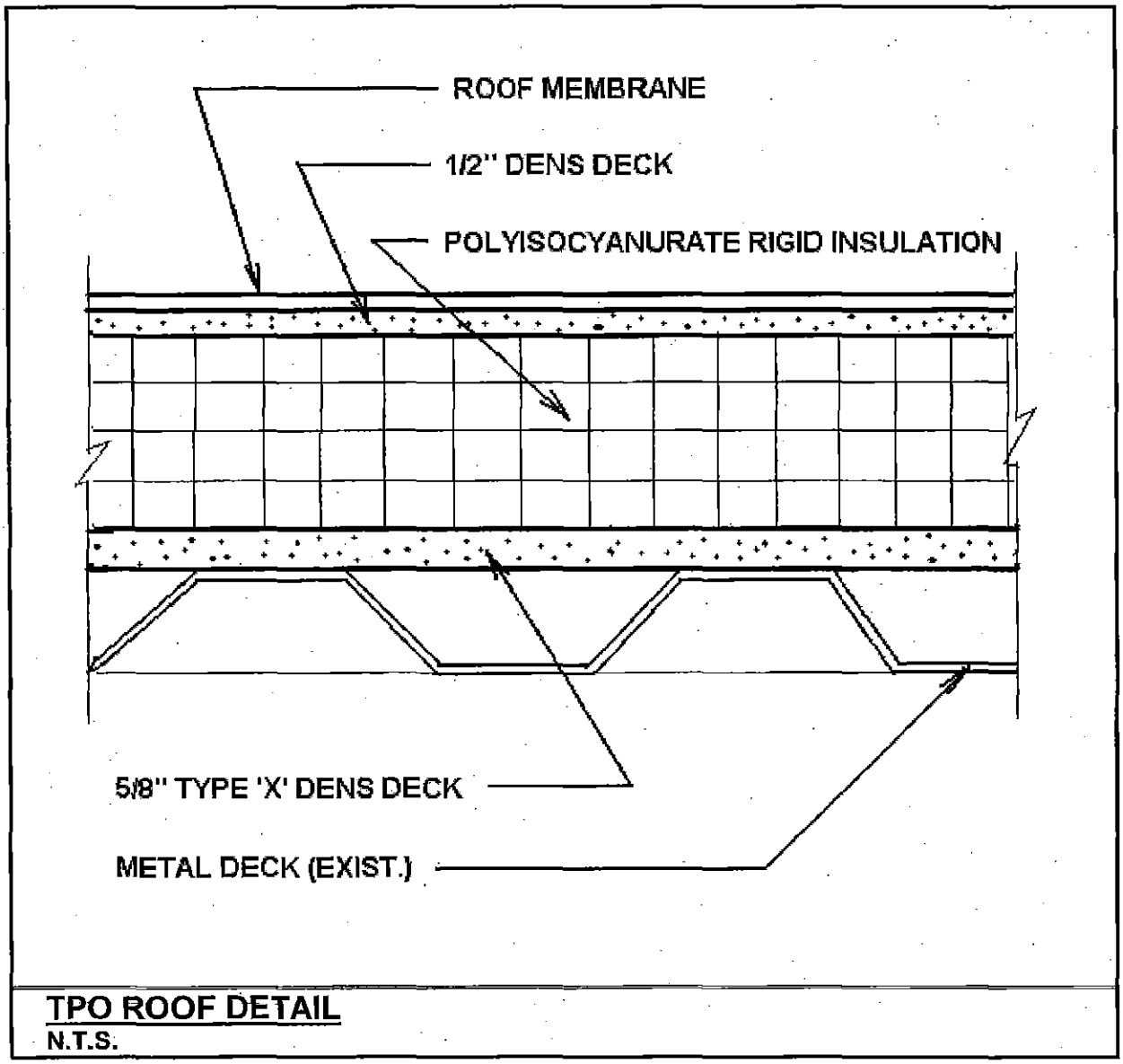
B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.13 TPO ROOF DETAILS (See next two sheets)



DETAIL 1 – Roof / Wall Flashing N.T.S.



TPO ROOF DETAIL
N.T.S.

END OF SECTION 075430

SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Grout.
3. Mechanical demolition.
4. Equipment installation requirements common to equipment sections.
5. Painting and finishing.
6. Supports and anchorages.
7. For grounding of mechanical materials, see electrical Sections.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. Pipe, pipefittings, and piping include tube, tube fittings, and tubing.

1.3 REFERENCE STANDARDS

A. American Society of Mechanical Engineers (ASME)

1. A13.1: Scheme for the Identification of Piping Systems.
2. B1.20.1: Pipe Threads, General Purpose (Inch)
3. B16.20: Metallic Gaskets for Pipe Flanges-Ring-Joint, Spiral-Wound, and Jacketed.
4. B16.21: Nonmetallic Flat Gaskets for Pipe Flanges.
5. B18.21: Square and Hex Bolts and Screws Inch Series.

B. American Society for Testing and Materials (ASTM)

1. A47: Specification for Ferritic Malleable Iron Castings.
2. A53: Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. A126: Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
4. A536: Specification for Ductile Iron Castings.
5. B32: Specification for Solder Metal.
6. B88: Specification for seamless copper tube.
7. B306: Specification for copper drainage tube.

C. American Welding Society (AWS)

1. D1.1: Structural Welding Code Steel.
2. D10.12: Recommended Practices and Procedures for Welding Low Carbon Steel.

1.4 SUBMITTALS

A. None required for this section

1.5 QUALITY ASSURANCE

A. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

B. Characteristics for Mechanical Equipment: Equipment of greater or larger power, dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. If larger equipment is approved, no additional costs shall be approved for these increases. If minimum energy ratings or efficiencies of the equipment are specified, the equipment must meet the design requirements and commissioning requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. When stored inside, do not exceed structural capacity of the floor.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

D. Provide covered shelters for storage of all mechanical equipment. Cover all equipment with polyethylene covering.

1.7 COORDINATION

A. Layout Work from building and property lines and benchmarks provided, verify, and be responsible for the correctness of measurements in connection with Work. Change made to major overall dimensions shown which affect the physical size, shape, or location of any part of the Work, whether due to field check or changes due to the use of equipment of a manufacturer other than that used as a basis of design shall cause no interference with other Work.

B. Examine the Drawings of other trades. Cooperate and coordinate with other trades to insure that the Work can be installed properly as designed and planned without interference with other work or delay. Where interferences may occur and departures from arrangements shown are required, consult with other trades involved. Come to an agreement as to changes, locations, and elevations. Furnish all necessary templates, patterns, measurements, etc., for installation and for the purpose of making adjoining work conform. Furnish setting plans and shop details to other trades as required.

C. Investigate the structural and finish conditions affecting the Work. Offsets, bends or other items required may not be shown due to the small scale of the Drawings; provide such offsets, bends or other items as required to meet structural or finish condition.

D. Coordinate and be responsible for the required clearances in shafts, chases, double partitions and suspended ceilings. Coordinate and cooperate with the trades responsible for constructing such spaces, together with other trades sharing such spaces, and advise other trades of the requirements of the Work. Immediately submit for review large-scale composite Drawings showing space requirements that exceed those shown.

E. If work is installed before coordinating with other trades so as to cause interference with the work of other trades, or so as not to provide proper access for maintenance or repair, make necessary changes to correct the condition at no cost to the government.

F. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations.

G. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the work. Coordinate installation of large equipment requiring positioning prior to closing in the building.

H. Coordinate connection of electrical services.

I. Coordinate installation of identifying devices after completing covering and painting where devices are applied to surfaces. Install identifying devices prior to installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Known Acceptable Source: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 15 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, NBR 1/8-inch minimum thickness. Pressure rating (psi) multiplied by temperature rating (deg F) shall be minimum of 320,000.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Full-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, face, 1/8 inch thick, full-face, unless otherwise indicated: For ductile Iron flanges.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

1. Known Acceptable Source:

a. Watts Industries, Inc.; Water Products Div.
b. Zurn Industries, Inc.; Wilkins Div.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

1. Known Acceptable Source:

a. Epco Sales, Inc.
b. Watts Industries, Inc.; Water Products Div.

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Known Acceptable Source:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Pipeline Seal and Insulator, Inc.

2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

1. Known Acceptable Source:

a. Calpico, Inc.
b. Lochinvar Corp.

G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F .

1. Known Acceptable Source:

a. Perfection Corp.

b. Precision Plumbing Products, Inc.

2.5 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 MECHANICAL DEMOLITION

A. Refer to Division 1 for general demolition requirements and procedures.

B. Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Equipment to Be Removed: Disconnect and cap services and remove equipment.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

D. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of the trades involved.

E. Repair cut surfaces to match adjacent surfaces.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes. Where slope is not indicated, install mains with a slope of not less than 1/8 inch in 10 feet, in direction of flow, upward in the case of water under pressure, whenever possible. Branches shall be pitched to drain. Changes in size of horizontal mains shall be made by means of eccentric reducers placed at least 18 inches beyond the connection from the main with the top of the pipe flat. Install drains at low points in mains, risers, and branch lines; consisting of a tee fitting, 3/4-inch ball valve, and short 3/4-inch threaded nipple and cap.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation plus 1 inch clearance around insulation.

J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

K. Install couplings according to manufacturer's printed instructions.

L. Select system components with pressure rating equal to or greater than system operating pressure.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 15 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate Teflon tape with a thin layer of Teflon pipe thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article. Provide local ventilation in conformance with ACGIH Print VS-90-02

H. Flanged Joints:
1. Use antiseize lubricant on all bolt threads. Use "Bostik Neverseize" or equivalent.
2. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment. Provide a thin layer of "Bostik Neverseize" or equivalent on threads and seal ring.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

4. Ferrous metal piping located overhead in electronic equipment areas shall have welded joints.

3.5 PIPING TESTING

A. Piping systems shall be tested and receive approval from the COTR before acceptance. Piping shall be tested before covering and concealing. Tests shall be conducted in the presence of the COTR, and notice shall be given not less than 3 days in advance of tests. Instruments, facilities, and labor required to conduct tests shall be furnished by the Contractor. Test instruments and equipment shall be checked for capability and calibration before each use and shall be adjusted to required capacity and accuracy where necessary. Submit written report for each test to COTR.

1. Piping shall be tested with compressed air prior to hydrostatic testing to minimize the possibility of a leak causing damage to the facility or equipment located within the facility. Provide air compressor and all required test equipment. Air test shall be at a minimum of 40 psi for not less than two hours during which time all joints shall be inspected for leaks. Components such as pumps or valves not designed to operate under test pressures shall be removed or blocked from the system during tests and shall be reinstalled or unblocked after tests. Blank-off or replace with spool pieces, instruments, gages, equipment, safety or relief valves rated at pressure lower than test pressure during testing. Test and adjust alarms for satisfactory operating conditions.
2. Piping shall be hydrostatically tested. Components such as pumps or valves not designed to operate under test pressures shall be removed or blocked from the system during tests and shall be reinstalled or unblocked after tests. Blank-off or replace with spool pieces, instruments, gages, equipment, safety or relief valves rated at pressure lower than test pressure during testing. Test and adjust alarms for satisfactory operation conditions.
3. Hydrostatic tests shall be performed and shall be held with no leakage for not less than two hours during which time all joints shall be inspected for leaks. After satisfactory completion of pressure tests, but before permanently connecting equipment, clean equipment and blow out the piping for sufficient length of time to ensure the interior is free of any foreign matter. Make adjustments, repairs, alterations and corrections, to meet specified test results. Inform COTR 48 hours in advance to witness the cleaning procedure.
    a. Correct defects disclosed by tests or inspection and replace defective parts, at no additional cost to Government. In replacing defective parts, use only new material; in the case of pipe, replace with the same length as the defective piece.
    b. Caulking of screwed joints or peening of welds is not acceptable. After defects have been corrected and parts replaced, retest until the system meets specified pressures.
    c. Test and adjust parts to specified pressures.
    d. Test and set safety and relief valves to specified relief pressure.
    e. After installation, test and adjust gages, thermometers, meters, and other instruments to ensure accurate operation and calibration.

3.6 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment in accordance with approved shop drawings and approved submittal data.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

E. Install equipment to allow right of way for piping installed at required slope.

3.7 PAINTING

A. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.8 CONCRETE BASES

A. Concrete Bases:

1. Anchor equipment to existing concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
2. Not used.
3. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.9 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1 and GIH Print VS-90-02.

3.10 GROUTING

A. Mix and install grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's printed instructions.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout in accordance with manufacturer's printed instructions.

3.11 DEMONSTRATION AND TRAINING

A. Demonstration and Training: Provide demonstration and training in accordance with specifications.

3.12 LOCAL VENTILATION

A. Provide local ventilation during construction for any activity, which produces vapors, gases, odors, dust, fumes, etc. Air shall be exhausted to the exterior of the building. Provide ventilation for welding operations and for the application or use of adhesives, paints, solvents,

fireproofing, sealants or any other product, which may cause acute or chronic health or safety effects to facility occupants. Ventilation shall comply with Occupational Safety and Health Administration (OSHA) and American Conference of Government Industrial Hygienists (ACGIH) requirements. The ventilation shall maintain the dust, gas, odor, fume, and vapor concentrations below the OSHA and ACGIH exposure limits as defined on the product MSDS and in "1999 TLVs and BEIs, Threshold Limit Values for Chemical Substances and Physical Agents."

3.13 PIPE AND PIPE FITTINGS, SCHEDULES

A. General:

Item	Size (inches)	Description
Pipe joints	2 and smaller ferrous metal	Threaded or socket welded
	2-1/2 and larger ferrous metal	Butt welded
Pipe joints	Copper tubing	Solder joint, or flared tube type as indicated
Branch connections (ferrous metal)	Same as line size, typically;	Straight tees
	At Reducing branches	Reducing outlet tees shall be used
Flanges (bored to suit pipe)	Typically, except as noted below	Weld neck, with raised face
	Where mated to valves or equipment having flat face flanged connection	Weld neck with flat face. Flange shall match psi rating of equipment flange
Gaskets	2-1/2" and larger flanged connection	Refer to paragraph 2.3.B this section.
Bolting materials	Where both flanges are raised face steel	ASTM A193, Grade B7, studs with ASTM A194, Grade 2, or 2H heavy hex nuts. ANSI B1.1 course thread series Class 2 fit.
	Where one or both flanges are flat faced	ASTM A307, Grade B, machine bolts and nuts.
Thread compound and joint lubricant		Teflon tape
Dielectric Unions	Where ferrous and nonferrous materials are connected	Epco nut or flange type unions with insulators and gaskets to suit requirements

END OF SECTION 15050

SECTION 15075 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes mechanical identification materials and devices.

1.2 REFERENCE STANDARDS

A. American Society of Mechanical Engineers (ASME)

1. A13.1: Scheme for Identification of Piping Systems.

B. American Society for Testing and Materials (ASTM)

1. C1036: Standard Specification for Flat Glass.
2. D709: Standard Specification for Laminated Thermosetting Material.

1.3 SUBMITTALS

A. Prepare submittal data as specified in Section 011000, "General Requirements." In addition, provide the following.

B. Samples of color, lettering style, and other graphic representation required for each identification material and device.

1.4 QUALITY ASSURANCE

A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.5 SEQUENCING AND SCHEDULING

A. Coordinate installation of identifying devices after completion of covering and painting where devices are applied to surfaces. Install identifying devices prior to installation of acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 IDENTIFYING DEVICES AND LABELS

A. General: Products specified are manufacturer's standard products of categories and types required for each application as referenced in other Division 15 and 23 Sections. Where more than single type is specified for listed application, selection is Installer's option, but provide single selection for each product category.

B. Equipment Nameplates: Metal nameplate permanently fastened to equipment and having data engraved or stamped.

1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
2. Location: An accessible and visible location.

C. Pressure-Sensitive Pipe Markers: Manufacturer's standard pre-printed, color-coded, pressure-sensitive vinyl pipe markers, with permanent adhesive conforming to ASME A13.1.

PART 3 - EXECUTION

3.1 LABELING AND IDENTIFYING

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.

1. Locate pipe markers and color bands as follows:

a. Near each valve and control device.
b. Mark each pipe at branch, where flow pattern is not obvious.
c. Near major equipment items and other points of origination and termination.
d. Spaced at a maximum of 50-foot intervals along each run. Reduce intervals to 25 feet in congested areas of piping and equipment.

B. Equipment: Install engraved plastic laminate signs or equipment markers on or near each major item of mechanical equipment.

3.2 PIPE IDENTIFICATION

A. The following is a list of the color coding to be used to identify piping installed on this project. Insulated pipe shall be provided with colored PVC jacketing with colors approved by COTR. Uninsulated pipe shall be painted as follows:

TYPE/USE	COLOR
Drain and Storm Piping	Per COTR

3.3 ADJUSTING AND CLEANING

A. Relocate mechanical identification materials and devices which have become visually blocked by work of this Division or other Divisions.

END OF SECTION 15075

SECTION 233423 - HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Centrifugal roof ventilators.

1.3 PERFORMANCE REQUIREMENTS

A. Operating Limits: Classify according to AMCA 99.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Also include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material thickness and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.
6. Roof curbs.
7. Fan speed controllers.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.

C. Delegated-Design Submittal: For unit hangars and supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

2. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Roof framing and support members relative to duct penetrations.
2. Ceiling suspension assembly members.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: One set for each belt-driven unit.

1.8 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.

C. UL Standards: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

1.9 COORDINATION

A. Coordinate size and location of structural-steel support members.

B. Coordinate sizes and locations of concrete bases with actual equipment provided.

C. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

PART 2 - PRODUCTS

2.1 CENTRIFUGAL ROOF VENTILATORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Acme Engineering & Manufacturing Corporation.
2. Aerovent; a division of Twin City Fan Companies, Ltd.
3. American Coolair Corporation.
4. Ammerman; Millennium Equipment.
5. Breidert Air Products.
6. Broan-NuTone LLC.
7. Broan-NuTone LLC; NuTone Inc.
8. Carnes Company.
9. Central Blower Company.
10. Delhi Industries Inc.
11. Greenheck Fan Corporation.
12. Hartzell Fan Incorporated.
13. JencoFan.
14. Loren Cook Company.
15. PennBarry.
16. Quietaire Inc.

B. Housing: Removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.

1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains and grease collector.
2. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.

C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.

D. Belt Drives:

1. Resiliently mounted to housing.
2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
4. Pulleys: Cast-iron, adjustable-pitch motor pulley.
5. Fan and motor isolated from exhaust airstream.

E. Accessories:

1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.

2. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
3. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
4. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.

F. Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.

1. Configuration: Self-flashing without a can strip, with mounting flange.
2. Overall Height: 8 inches.
3. Sound Curb: Curb with sound-absorbing insulation.

2.2 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors and HVAC equipment.

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

B. Enclosure Type: Totally enclosed, fan cooled.

2.3 SOURCE QUALITY CONTROL

A. Certify sound-power level ratings according to AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Certify fan performance ratings, including flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating." Label fans with the AMCA-Certified Ratings Seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install power ventilators level and plumb.

B. Install units with clearances for service and maintenance.

C. Label units according to requirements.

3.2 CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors.

B. Install ducts adjacent to power ventilators to allow service and maintenance.

C. Ground equipment according to Section 16452 "Grounding" for Electrical Systems.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
5. Adjust belt tension.
6. Adjust damper linkages for proper damper operation.
7. Verify lubrication for bearings and other moving parts.
8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
10. Shut unit down and reconnect automatic temperature-control operators.
11. Remove and replace malfunctioning units and retest as specified above.

C. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

C. Comply with requirements for testing, adjusting, and balancing procedures.

D. Replace fan and motor pulleys as required to achieve design airflow.

E. Lubricate bearings.

END OF SECTION 233423

SECTION 16190 - SUPPORTING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes secure support from the building structure for electrical items by means of hangers, supports, anchors, sleeves, inserts, seals, and associated fastenings.

1.2 REFERENCE STANDARDS

A. Reference standards noted are applicable only to the extent specified.

B. National Fire Protection Association (NFPA)

1. 70: National Electrical Code (NEC) latest edition.

C. Underwriters Laboratories (UL)

1.3 SUBMITTALS

A. Product data for each type of product specified.

1.4 QUALITY ASSURANCE

A. Electrical Component Standard: Components and installation shall comply with NFPA 70.

B. Electrical components shall be listed and labeled by UL or other approved, nationally recognized testing and listing agency that provides third-party certification follow-up services.

PART 2 - PRODUCTS

2.1 COATINGS

A. Coating: Supports, support hardware, and fasteners within the boiler room shall be hot-dip galvanized. Products for use outdoors shall be hot-dip galvanized.

2.2 MANUFACTURED SUPPORTING DEVICES

A. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps.

B. Fasteners: Types, materials, and construction features as follows:

1. Expansion Anchors: Carbon steel wedge or sleeve type.
2. Toggle Bolts: All steel springhead type.
3. Powder Actuated fasteners: Not Allowed.

C. U-Channel Systems: 16-gage steel channels, with 9/16-inch-diameter holes, at a minimum of 8 inches on center, in top surface. Provide fittings and accessories that mate and match with U-channel and are of the same manufacture.

D. Fasteners for plastic-laminated and metal signs: Self-tapping stainless steel screws or No. 10/32 stainless steel machine screws with nuts and flat end lock washers.

E. Provide steel channel supports with 9/16-inch diameter holes at a maximum of 8 inches on center, in at least 1 surface.

1. Fittings and accessories to mate and match with channels and to be from same manufacturer.

2.3 FABRICATED SUPPORTING DEVICES

A. General: Shop- or field-fabricated supports or manufactured supports assembled from U-channel components.

B. Steel Brackets: Fabricated of angles, channels, and other standard structural shapes. Connect with welds and machine bolts to form rigid supports.

C. Pipe Sleeves: ASTM A53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

1. Sheet Metal: Fabricate from galvanized sheet metal; round tube closed with welded spiral seams or welded longitudinal joint. Fabricate sleeves from the following gage metal for sleeve diameter noted:

a. 3-inch and smaller: 20-gage.
b. 4-inch to 6-inch: 16-gage.
c. over 6-inch: 14-gage.

2. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe.

D. Supplementary Structural Supports: ASTM A36 steel shapes

1. Supports and supporting devices shall be designed and installed to withstand the local code equivalent of a minimum UBC Seismic Zone 2B force.
2. Provide the installation of supplementary structural supports required for attachment of hangers and other devices supporting electrical equipment and conduits.
3. Members welded to main structural members shall be equal to the specification for the main structural member.
4. Size support members for their actual loads and safety factors without excessive deflection and with consideration for rigidity under vibration.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.

B. Coordinate with the building structural system and with other electrical installation.

C. Raceway Supports: Comply with the NEC and the following requirements:

1. Conform to manufacturer's recommendations for selection and installation of supports.
2. Strength of each support shall be adequate to carry design load plus 25 percent for future use, multiplied by a safety factor of at least four. Where this determination results in a safety allowance of less than 200 lb., provide additional strength until there is a minimum of 200 lb. safety allowance in the strength of each support.

3. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
4. Support parallel runs of horizontal raceways together on trapeze-type hangers.
5. Support individual horizontal raceways by separate pipe hangers. Spring steel fasteners may be used in lieu of hangers only for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For hanger rods with spring steel fasteners, use 1/4-inch-diameter or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing.
6. Space supports for raceways in accordance with the NEC.
7. Support exposed and concealed raceway within 1 foot of an unsupported box and access fittings. In horizontal runs, support at the box and access fittings may be omitted where box or access fittings are independently supported and raceway terminals are not made with chase nipples or threadless box connectors.
8. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.
9. Neither raceways nor boxes shall be fastened to suspended ceiling supports.

D. Miscellaneous Supports: Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.

E. In open overhead spaces, cast boxes threaded to raceways need not be supported separately except where used for fixture support; support sheet metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, support the bar hanger from the building structure, not on the ceiling cross members.

1. Cast metal boxes having threadless connectors and sheet-metal boxes shall be supported directly from the building structure or by bar hangers.

F. Sleeves: Install in concrete slabs and walls and all other fire- rated floors and walls for raceways and cable installations. For sleeves through fire rated-wall or floor construction, apply UL- listed firestopping sealant in gaps between sleeves and enclosed conduits and cables.

G. Fastening: Unless otherwise indicated, fasten electrical items and their supporting hardware securely to the building structure, including but not limited to conduits, raceways, cables, cable trays, busways, cabinets, panelboards, transformers, boxes, disconnect switches, lighting fixtures, and control components in accordance with the following:

1. Fasten by means of wood screws, carriage bolts, or lag screws of equal holding strength on wood; toggle bolts on hollow masonry units; concrete inserts or expansion bolts on concrete or solid masonry; and machine screws, or spring-tension clamps on steel. Do not weld conduit, pipe straps, to steel structures. In partitions of light steel construction, use sheet metal screws.
2. Holes cut to depth of more than 1-1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete shall not cut the main reinforcing bars. Patch holes that are not used with like and kind materials.

3. Coordinate any cutting or boring of structural beams with Structural Engineer prior to any work being done.
4. Ensure that the load applied to any fastener does not exceed 25 percent of the proof test load. Use vibration- and shock- resistant fasteners for attachments to concrete slabs.
5. Coordinate with structural engineer on expansion joints used to support raceways.

H. Tests: Test pull-out resistance of one of each type, size, and anchorage material for the following fastener types:

1. Expansion anchors.
2. Toggle bolts.

I. Provide all jacks, jigs, fixtures, and calibrated indicating scales required for reliable testing. Obtain the structural Engineer's approval before transmitting loads to the structure. Test to 90 percent of rated proof load for fastener. If fastening fails test, revise all similar fastener installations and retest until satisfactory results are achieved.

END OF SECTION 16190

SECTION 05520 – PORTABLE GUARD RAIL SYSTEM

PART 1 GENERAL

1.1 SCOPE OF WORK: Portable guard rail system for roof edge protection at the cafeteria wing of the Chicago Air Route Traffic Control Center in Aurora, Illinois..

1.2 RELATED SECTIONS

A. Section 011000 – General Requirements: Bid options.

B. Section 075430 – Thermoplastic Polyolefin (TPO) Roofing: Coordination of roof edge protection installation.

1.3 REFERENCES

A. Occupational Safety & Health Administration (OSHA): 29 CFR 1910.23 - Guarding Floor and Wall Openings and Holes.

B. Occupational Safety & Health Administration (OSHA): 29 CFR 1926.502 - Fall Protection Systems Criteria and Practices.

1.4 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the job site in good condition and adequately protected against damage as handrails are a finished product.

B. Inspect rail sections for damage.

C. Store products in manufacturer's unopened packaging until ready for installation.

1.6 WARRANTY

A. Warranty: Provide manufacturer's two (2) year warranty.

PART 2 PRODUCTS

2.1 ACCEPTABLE PRODUCTS

A. Acceptable Manufacturer: "SafetyRail 2000" by BlueWater Manufacturing., Inc., 4064 Peavey Rd.; Chaska, MN 55318; Tel: 866-933-2935 or 952-448-2935; Fax: 952-448-3685;

B. Subject to compliance with requirements, equivalent products by the following manufacturers may be used:
1. "Railguard 200" by Garlocke Equipment, 2601 Niagara Lane N, Plymouth, MN 55447, Tel.: 800-328-5914 or 763-694-2649, Fax: 800-820-3268 or 763-553-1093.

2. "Portable Guard Rail" by DBI-Sala Safety Products, Tel: 941-894-0564..

2.2 FITTINGS: Provide fittings required for a complete operational system that meets OSHA requirements

2.3 ACCESSORIES

A. Roof Pads: Provide neoprene slip sheet or roofing pad under each base to protect roof membrane.

B. Base Lifter/Mover: Provide base lifter/mover compatible with manufacturer's guard rail system.

2.4 FINISHES

A. Finish: Factory finished powder coat paint.

B. Color of powder-coat paint: Match existing roof handrail color as approved by Contracting Officer's Technical Representative (TOR).

2.5 FABRICATION

A. Assemble components with joints tightly fitted and secured. Accurately form components to suit installation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

3.2 PREPARATION

A. Prepare roofing surfaces using roof pads or methods recommended by the roofing manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions along edge of roof, approximately six (6) inches to eighteen (18) inches from edge. Provide a return segment that is perpendicular to each of the last guard rail segments.

B. Install bonding of guard rail system to the roof lightning protection system. Provide mechanically connected bridging jumpers between rail segments and their bases. Provide a Cadweld-connected jumper at each down conductor to the guard rail system.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 05520

FAA-C-1217f
February 26, 1996
SUPERSEDING
FAA-C-1217e,

US DEPARTMENT
01/25/91
OF TRANSPORTATION
Federal Aviation
Administration

U. S. Department of Transportation
Federal Aviation Administration
Specification

ELECTRICAL WORK, INTERIOR

FORWARD

This document has been revised to reflect current technology changes and to incorporate the latest commercial standards.

1. SCOPE

1.1 Scope.- This specification covers the ***minimum requirements*** for electrical work at FAA facilities. Where the phrase "unless otherwise indicated" or similar wording appears, it refers exclusively to other documents that are specific parts of the contract. Where there are requirements peculiar to specific FAA facility types, e.g., air route traffic control centers (ARTCCs), metroplex control facilities (MCFs), terminal radar control (TRACONs), etc., these requirements will be added following the appropriate paragraph.

2. APPLICABLE DOCUMENTS.- The current issues of the following documents in effect on the date of the invitation-for-bids or request-for-proposals form a part of this specification, and are applicable to the extent specified herein.

2.1 Federal specifications

(Power,	J-C-30	Cable and Wire, Electrical Fixed Installation)
	W-C-375	Circuit Breakers, Molded Case; Branch Circuit and Service
	W-F-414	Fixture, Lighting (Fluorescent, Alternating Current, Pedant Mounting)
	W-L-305	Light Set, General Illumination (Emergency or Auxiliary)
	W-P-115	Panel, Power Distribution
	WW-C-566	Conduit, Metal, Flexible
	QQ-W-343	Wire, Electrical, (uninsulated)

(To obtain copies of federal specifications, contact General Services Administration offices in Washington DC, Atlanta, Boston, Chicago, Dallas, Denver, Kansas City MO, Los Angeles, New York, San Francisco, or Seattle.)

2.2 Steel Structures Painting Council standards

SSPC-PS 10.01 Hot-Applied Coal Tar Enamel Painting System

(Single copies of SSPC Standards can be obtained from the Steel Structures Painting Council, 4400 Fifth Avenue, Pittsburgh, Pa 15213, 412/578-3327)

2.3 Federal Aviation Administration specification/standards/orders

FAA specification:

FAA-C-1391 Installation and Splicing of Underground Cables

FAA standards:

FAA-STD-019 Lightning Protection, Grounding, Bonding and Shielding Requirements for Facilities

FAA-STD-020 Transient Protection, Grounding, Bonding and Shielding Requirements for Electronic Equipment

FAA orders:

3900.49 Control of Hazardous Energy During Maintenance, Servicing and Repair

6950.19 Practices and Procedures for Lightning Protection, Grounding, Bonding and Shielding Implementation

6950.20 Fundamental Consideration of Lightning, Protection, Grounding, Bonding and Shielding

6950.22 and	Maintenance of Electrical Power Control Cables
6950.27	Short Circuit Analysis and Protective Device Coordination Study

(Copies of FAA specifications may be obtained from the Contracting Officer in the office issuing the invitation-for-bids or request-for-proposals. Requests should fully identify material desired, i.e., specifications, standard, amendment, and drawing numbers and dates. Requests should cite the invitation-for-bids, request-for-proposals, or the contract involved or other use to be made of the requested material.)

2.4 National Fire Protection Association (NFPA) publications

NFPA 70	National Electrical Code (NEC)

(Requests for copies of NFPA publications should be addressed to the National Fire Protection Association, Batterymarch Park, Quincy MA 02269.)

2.5 National Electrical Manufacturers Association (NEMA) standards

OS-1	Sheet Steel Outlet Boxes, Device Boxes, covers and Box Supports
MG-1 Generators	Standard for Motors and
ST 20	Dry Type Transformers for General Applications
VE 1	Cable Tray Systems
WC 5	Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy

WD 1 General Requirements for Wiring Devices

(For copies of NEMA standards, contact the National Electrical Manufacturers Association, 2101 L Street N.W. Washington DC 20057, 202/457-8400.)

2.6 Underwriters' Laboratories (UL) Inc. standards

UL 5 Surface Metal Raceways and Fittings

UL 6 Rigid Metal Conduit

UL 50 Enclosures for Electrical Equipment

UL 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors

UL 486C Splicing Wire Connectors

UL 486E Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors

UL 514A Metallic Outlet Boxes

UL 514B Fittings for Conduit and Outlet Boxes

UL 542 Lampholders, Starters, and Holders for Fluorescent Starter Lamps

UL 651 Schedule 40 and 80 Rigid PVC

UL 797 Electrical Metallic Tubing

UL 870 Wireways, Auxiliary Gutters and Associated Fittings

UL 935 Fluorescent-Lamp Ballasts

UL 1242 Intermediate Metal Conduit

(For copies of UL standards, contact Underwriters' Laboratories Inc., Publication Department, 333 Pfingsten Rd., Northbrook IL 60062.)

2.7 Institute of Electrical and Electronics Engineers (IEEE) Inc. standards

STD C57.12.80 Standard Terminology for Power Distribution Transformers

and

STD 141 Recommended Practice for Electric Power Distribution for Industrial Plants

STD 519 Recommended Practices and Requirements for Harmonic Control and Electrical Power Systems

STD 1100 Recommended Practice for Powering and Grounding Sensitive Electronic Equipment

For copies of this standard, contact the IEEE Inc., Service Department, 445 Hoes Lane, PO Box 1331, Piscataway NJ 08855-1331.)

2.8 Other documents

2.8.1 Local utility companies.- The rules and regulations of the local utility companies providing service.

2.8.2 Local governing bodies.- The rules, regulations, and codes of local governing bodies.

3. MATERIALS

3.1 General.- The contractor shall furnish all materials not specifically identified as Government Furnished Materials in the invitation-for-bids or contract. Materials and equipment shall comply with all requirements of the contract documents. Materials furnished by the contractor shall be new, the standard

products of manufacturers regularly engaged in the production of such materials, and of the manufacturer's latest designs that comply with the specification requirements. If materials and equipment requirements conflict, the order of precedence for selection shall be as follows: special contract provision, the contract drawings, this specification, and then continuing order of precedence, referenced FAA documents, Military documents, Federal specifications, NFPA publications, IEEE standards; UL standards and NEMA standards. Wherever standards have been established by Underwriters' Laboratories, Inc., the material shall bear the UL label.

4. INSTALLATION

NOTE: Unscheduled interruptions of the electrical service to FAA facilities may cause aircraft accidents and loss of life. Work requiring a temporary or permanent deenergization of equipment shall be scheduled in writing with the onsite FAA maintenance personnel. Only onsite FAA maintenance personnel are authorized to energize, deenergize equipment or to operate a circuit breaker, switch, or fuse in an FAA facility. Work procedures shall include lock-out/tag-out procedures in accordance with FAA Order 3900.49.

4.1 General.- The rules, regulations and reference specifications enumerated herein shall be considered as minimum requirements. FAA requirements often exceed those of other standards organizations such as the NEC. Adherence to other standards shall not relieve the contractor from furnishing and installing higher grades of materials and workmanship when so required by this specification. Adherence to this specification shall not relieve the contractor from furnishing and installing higher grades of materials and workmanship when so required by the contract drawings or special contract provisions. This specification shall govern when conflicts occur between it and the documents referenced in paragraph 2, Applicable documents, and in the order of precedence established in paragraph 3, Materials.

4.1.1 Short circuit analysis and protective device coordination (SCA/PDC). - The distribution system and all component parts, when installed or as modified, shall be in accordance with IEEE Standard 519, Recommended Practices and Requirements for Harmonic Control and

Electrical Systems, and shall include a short circuit analysis and protective device coordination study in accordance with FAA Order 6950.27.

4.2 Workmanship.- All materials and equipment shall be installed in accordance with the contract drawings. When manufacturers recommended installation methods conflict with contract requirements, differences shall be resolved by the Contracting Officer. The installation shall be accomplished by qualified workers regularly engaged in this type of work. Where required by local regulations, the workers shall be properly licensed.

4.3 Contract drawings.- Where the electrical drawings indicate (by diagram or otherwise) the work intended and the functions to be performed, even though some details are not shown, the contractor shall furnish all equipment, material (other than the Government-furnished items, see paragraph 3.1) and labor to complete the installation work and to accomplish all the indicated functions of the electrical installation. Further, the contractor shall be responsible for taking the necessary actions to ensure that all electrical work is coordinated and compatible with architectural, mechanical, and structural plans, and the layout of any special electronic equipment.

4.3.1 Minor departures.- Minor departures from exact dimensions shown on the electrical plans may be permitted when required to avoid conflict or unnecessary difficulty in placement of a dimensioned item, provided all contract requirements are met. The contractor shall promptly obtain approval from the Contracting Officer prior to undertaking any such departure and shall provide appropriate documentation of the departure.

4.4 Grounding

4.4.1 General.- FAA grounding requirements often exceed those of the NEC. Grounding systems shall be as indicated on the contract drawings and as specified herein. Reference IEEE Standard 1100-1992, Recommended Practice for Powering and Grounding Sensitive Electronic Equipment, when installing all NAS equipment. In no case, however, shall the NEC be violated.

4.4.2 Grounding electrode conductor.- The grounding electrode conduct shall be bare or insulated copper and shall be sized as shown in the contract documents. When not indicated in the contract documents, the conductor shall be copper and sized in accordance with Table 250-94, "Grounding Electrode Conductor for AC Systems", of the NEC, except that the conductor shall not be smaller than No. 6 AWG. Where the grounding electrode conductor is routed through a metal raceway, the raceway shall be electrically continuous and bonded to the conductor at each end. The grounding electrode conductor shall be bonded to the earth electrode system with an exothermic welded joint. For a separately derived system such as an isolation transformer, the grounding electrode conductor shall be connected in accordance with the NEC. This conductor shall be permitted to terminate by exothermic welding to an equipment room's perimeter ground cable under a raised floor.

4.4.3 – Earth electrode system.- The earth electrode system shall be installed as shown in the contract documents. Unless otherwise indicated in these documents, the earth electrode system shall consist of a minimum of four (4) ground rods located at the corners of a structure. Rods shall be spaced apart a distance equal to or greater than the length of the rods. Ground rods shall be 3/4 inch by 10 feet, copper or copper-clad steel. Sectionalized type or exothermic butt welded rods shall be used when deeper earth penetration is required. Rods shall be interconnected by a bare copper cable forming a closed loop around a structure. The cable shall be a minimum No. 4/0 AWG and shall be buried at least 2 feet below grade. The top of the vertically-driven ground rods shall be a minimum of 12 inches below grade. All underground metal pipes (excluding gas piping systems), tanks, and the telephone ground, if present, shall be connected to the earth electrode system by a copper cable no smaller than No. 2 AWG. All underground connections shall be made by exothermic welding process unless otherwise indicated.

4.4.4 Earth electrode system resistance.- The resistance of the earth electrode system shall not exceed 10 ohms, as tested per paragraph 5.3.6, unless otherwise indicated. If the measured resistance exceeds 10 ohms,

the Contracting Officer shall be notified immediately for further guidance.

4.4.5 Equipment grounding conductor

4.4.5.1 General.- All metallic non-current carrying parts of electrical equipment shall be grounded with equipment grounding conductors whether or not shown on the drawings. Equipment grounding conductors shall always be green insulated copper conductors unless otherwise indicated. Non-insulated equipment grounding conductors are not allowed. When these conductors are not sized, or shown on the contract drawings, they shall be sized in accordance with Table 250-95, "Minimum Size Equipment Grounding Conductors for Grounding Raceway and Equipment", of the NEC.

4.4.5.2 Connections.- There shall be no interconnection between equipment grounding conductors and neutral conductors except at the main service and separately derived sources. All connections to equipment to be grounded shall be made with a grounding connector specifically intended for that purpose. Bare wire, wrapped around mounting bolts and screws, is not acceptable as a grounding connection. All ground lugs shall be of a noncorrosive material suitable for use as a grounding connection, and must be compatible with the type of metal being grounded. All mating surfaces and connections shall be between cleaned bare metal to bare metal surfaces.

4.4.5.3 Installation.- Each overcurrent device shall have its own equipment grounding conductor, i.e., a single-pole single-phase overcurrent device shall be supplied with an equipment grounding conductor; a two-pole, single-phase overcurrent device shall be supplied with its own equipment grounding conductor; a three-pole, three-phase overcurrent device shall be supplied with its own equipment grounding conductor. The equipment grounding conductor shall be installed in the same conduit as its related branch and feeder conductors and shall be connected to the ground bus in the branch or distribution panelboard. Metal conduit housing the equipment grounding conductor shall be electrically continuous, forming a parallel path to the equipment grounding conductor, except as allowed by the NEC. Where parallel feeders are installed in more than one raceway,

a full sized equipment grounding conductor shall be installed in each raceway.

4.4.6 Raceway grounding.- Surface metal raceways, wireways, or cable rack systems shall be installed in a manner that assures electrical continuity. Insulated copper bonding jumpers shall be installed between adjacent raceway sections to assure proper bonding. Uninsulated conductors shall not be used. Unless otherwise indicated, the minimum size for these bonding jumpers shall be No. 6 AWG. Where aluminum raceways are used, the jumpers shall be bonded with approved connectors for the dissimilar metals. All metallic raceway penetrations into a facility structure shall be bonded to the earth electrode system in accordance with FAA-STD-019.

4.4.7 Other grounding systems.- Any additional grounding systems used for electronic equipment shall be connected directly to the exterior earth electrode system or the perimeter ground cable under a raised floor in an equipment room. Other grounding systems shall not be used in place of the equipment grounding conductor system. The conductor used for other grounding (i.e., NEC 250-74, exception #4) systems shall be color coded green with a yellow stripe for single point isolated signal ground, green with an orange stripe for multipoint signal ground, green with a red stripe for high energy ground, green with a violet stripe for isolated equipment grounding connections.

4.5 Electrical surge protection

4.5.1 General.- All electrical surge protection systems shall be installed in accordance with FAA-STD-019.

4.5.2 Supply transformer.- For utility owned transformers, protective devices shall be at the discretion of the utility. For FAA-owned transformers, proper protection shall be provided on the primary side of the transformer.

4.5.3 Service entrance surge arrester.- A fused surge arrester provided with disconnect capability shall be installed on the line, (supply-side) of the service as close as possible to the service terminals. Separate terminating lugs shall be provided for the surge

arrester. This arrester shall be compatible with the service voltage, and shall be wired to avoid loops, sharp bends and kinks, and to minimize the number of bends. There shall be no interconnection between neutral and ground within the arrester. Arrester conductors shall be No. 4 AWG insulated copper or larger, unless a smaller size is recommended by the arrester manufacturer.

4.5.4 Transient suppression installations.- Where transient suppression devices are installed in the electrical power distribution system they shall be installed in accordance with manufacturers instructions unless otherwise specified.

4.5.5 Land line/cable penetration installations.- Suppression systems shall be provided for land line and cable penetration systems in accordance with FAA-STD-019. High energy grounding conductors shall be bonded directly to the earth electrode system or to the perimeter ground cable under raised floors in equipment rooms.

4.6 Wiring methods

4.6.1 General.- All wiring shall consist of insulated copper conductors installed in metallic raceways, unless otherwise specified.

4.6.1.1 Conductor routing.- Panelboards, surge arresters, disconnect switches, etc., shall not be used as raceway for conductor routing other than conductors that originate or terminate in these enclosures. Isolated ground conductors will be allowed to traverse these enclosures.

4.6.1.2 Conductor separation - Power conductors shall be routed separately from all other conductor types. This may be accomplished by routing power conductors and other conductors in separate raceways, or by a metallic divider between the power conductors and the other conductors in the same raceway.

4.6.2 Neutral conductor.- Shared/common neutrals shall not be permitted, i.e., each overcurrent device shall have its' own separate neutral conductor. Neutral conductor sizes shall not be less than the respective feeder or phase conductor sizes.

4.6.3 Raceway systems

4.6.3.1 General.- Each run shall be complete, and shall be fished and swabbed before conductors are installed. Ends of raceway systems not terminated in boxes or cabinets shall be capped. Exposed raceways shall be installed parallel to or at right angles with the lines of the structure. Crushed or deformed raceways shall not be installed. A pull wire shall be installed in all empty tubing and conduit systems in which wiring is to be installed by others. The pull wire shall be No. 14 AWG zinc-coated steel, or plastic with a minimum 200-pound tensile strength. Ten inches of slack shall be left at each end of the pull wire. Sections of raceways which pass through to damp, concealed, or underground locations shall be of a type allowed for such locations by NEC Article 300-5, and shall extend a minimum of 12 inches beyond the damp, concealed, or underground area. Where raceway has to be cut in the field, it shall be cut square and burrs and sharp edges removed. Where conduits penetrate walls or floors separating the building interior from the exterior, they shall be sealed to prevent moisture and rodent entry and to deter air transfer. In addition, where conduits penetrate walls separating individually controlled temperature or humidity controlled areas, they shall be sealed to prevent air circulation. Sealing methods and sealants shall be accordance with NEC Article 300-7. Openings around penetrations through fire-resistant-rated walls, partitions, floors, or ceilings shall be fire stopped using approved methods to maintain the fire resistance rating.

4.6.3.2 Conduit. – Minimum conduit size shall be 3/4 inch unless otherwise specified. Conduit for telephone and signal systems shall be allowed to be 1/2 inch. Where threads have to be cut on conduit, the threads shall have the same effective length and shall have the same thread dimensions and taper as specified for factory cut threads on conduit.

NOTE:

For ARTCCs, MCFs, and Large TRACONs, rigid steel conduit (RSC)or intermediate metal conduit (IMC) shall be used for all distribution panel feeders, transformer feeders, motor control center feeders and distribution

switchboards. Electrical metallic tubing (EMT) maybe used for communication, lighting and branch circuits.

4.6.3.2.1 Zinc coated rigid steel conduit (RSC).- Zinc coated rigid steel conduit (RSC) shall conform to UL 6. RSC, may be used in all locations and shall be used for all underground service conductors. For installation below slab, on-grade, or underground, the conduit shall conform to Steel Structures Painting Council Standard, SSPC-PS 10.01, or shall be field wrapped with 0.01-inch thick pipe wrapping plastic tape applied with 50% overlap. Fittings used underground shall be protected by field wrapping as specified herein for conduit. All fittings used with rigid steel conduit shall be the threaded type, of the same material as the conduit. Where conduits enter enclosures without threaded hubs, double locknuts (one on each side of the enclosure wall) shall be used to securely bond the conduit to the enclosure. In addition, a bushing shall be installed on the interior threaded end of the conduit to protect conductor insulation.

4.6.3.2.2 Intermediate metal conduit (IMC). IMC shall be zinc coated steel, shall conform to UL Standard 1242, and shall bear the UL label. For installation below slab on grade or underground, the conduit shall conform to Steel Structures Painting Council Standard, SSPC-PS 10.01, or shall be field wrapped with 0.01-inch thick pipe wrapping plastic tape applied with 50% overlay. Fittings used underground shall be protected by field wrapping as specified herein for conduit. Where it is necessary to fabricate IMC bends in the field, the tooling required to fabricate those bends shall be specifically designed for IMC. All fittings shall be of the threaded type, of the same material as the conduit. Where conduits enter enclosures without threaded hubs, double locknuts (one on each side of the enclosure wall) shall be used to securely bond the conduit to the enclosure. In addition, a bushing shall be installed on the interior threaded end of the conduit to protect conductor insulation.

4.6.3.2.3 Electrical metallic tubing (EMT).- EMT shall conform to UL 797. EMT may be used only in dry interior locations, and where not subject to physical damage. EMT shall not be used on circuits above 600 volts nor in sizes greater than 34 inches in diameter. Fittings used

with EMT shall be standard compression-type fittings designed for this type of EMT, unless otherwise indicated. Screw-type fittings are not acceptable. Where EMT enters enclosures without threaded hubs, an appropriate connector with threads and cast or machined (not sheet metal) locknut shall be used to securely bond the conduit to the enclosure. The connector body and locknut shall be installed so that firm contact is made on each side of the enclosure. In addition the connectors shall have an insulated-throat, smooth bell shaped end, or a bushing.

4.6.3.2.4 Rigid aluminum conduit.- Aluminum raceways shall not be used for any installation.

4.6.3.2.5 Rigid nonmetallic conduit.- Rigid nonmetallic conduit shall be heavywall PVC conforming to UL 651. Rigid nonmetallic conduit used to protect electrical power conductors may only be used underground, or in concrete, or as a vertical riser to 6 inches above grade or floor surface for connection to metal conduit; and only when required by the contract drawings or specific job specifications. PVC fittings shall be used with PVC conduit and shall be assembled in accordance with manufacturer's instructions. A PVC threaded fitting with locknut and plastic bushing shall be used to connect PVC conduit to boxes or cabinets without threaded hubs. Rigid nonmetallic conduit may be used to protect lightning protection system conductors and, in interior locations, to protect signal grounding conductors.

4.6.3.2.6 Flexible metal conduit.- Flexible metal conduit shall conform to Federal Specification, WW-C-566. Flexible metal conduit shall be used for terminal connections to motors or motor driven equipment, and in lengths only up to 6 feet for other applications permitted by the NEC. Liquid-tight flexible metal conduit shall be used outdoors and in wet locations. All flexible metal conduit shall be of a type where both the conduit and fittings are listed for grounding. This last requirement shall not apply to factory assembled equipment.

NOTE: Flexible metal conduit may be used under raised floor for branch circuits in lengths longer than 6 feet in computer room locations that meet all the requirements

of Article 645 of the NEC. All fittings and junction boxes shall be liquid tight types under the raised floor.

4.6.3.2.7 Flexible nonmetallic conduit.- Flexible nonmetallic conduit shall not be used.

4.6.3.3 Surface raceways.- Nonmetallic surface raceways shall not be used. Surface metal raceways shall conform to UL 5. Surface metal raceways shall be installed only in exposed, dry locations not subject to physical damage. Surface metal raceways shall meet NEC requirements, however, they shall not be used for circuits above 600 volts.

4 .6.3.4 Wireways.- Wireways shall conform to UL 870. Wireways shall only be installed in accessible locations. Wireways installed in wet or outdoor locations shall be rated for these locations.

4.6.3.5 Cable rack systems

4.6.3.5.1 General.- Cable rack systems shall be of the ladder or ventilated trough type conforming to NEMA Standard VE 1, unless otherwise indicated. All components for each cable rack system shall be the product of a single manufacturer. Cable rack support spacing shall be as recommended by the manufacturer except that in no case shall spacing of supports exceed 6 feet. Cable racks shall be supported from structural members only.

4.6.3.5.2 Dimensions.- Straight sections, bends, tees, offsets, reducers, etc., for ladder-type cable rack systems shall consist of 3 inch minimum side channels with suitable cross channels (rungs) installed on 6 inch centers unless otherwise indicated. Straight sections, fittings, etc., for ventilated-type cable rack systems, shall have 3 inch minimum high sides and a ventilated bottom with cross pieces 2 inches (maximum) wide on 3 inch (maximum) centers and openings 2 inches (maximum) wide. Cable rack widths shall be as shown on the drawings.

4.6.4 Raceway support systems

4.6.4.1 General.- Raceways shall be securely supported at intervals specified in the NEC Article 300-11,

"Securing and Supporting", and fastened in place with pipe straps, wall brackets, hangers, or ceiling trapezes. Fastenings shall be by wood screws, nails or screw-type nails to wood; by toggle bolts on hollow masonry units; by expansion-bolts on concrete or brick; by machine screws, welded threaded studs, or spring tension clamps on steel work. Nail type nylon anchors or threaded studs driven by a power charge and provided with lock washers and nuts may be used in lieu of expansion bolts, machine screws, or wood screws. Threaded C clamps with retainers may be used. Raceways or pipe straps depth of more than 1-1/2 inch in reinforced concrete beams, or to a depth of more than 3/4 inch in reinforced concrete joists, shall not cut the main reinforcing bars. Holes not used shall be filled. In partitions of light steel construction, sheet-metal screws may be used. Raceways shall not be supported from sheet-metal roof decks. In suspended-ceiling construction, raceways shall not be fastened to the suspended-ceiling supports.

4.6.4.2 Telephone and signal raceways.- Telephone and signal system raceways shall be installed in accordance with the previous requirements for conduit and tubing, with the additional requirements that no length of run shall exceed 50 feet for 1/2-inch and 3/4-inch sizes, and 100 feet for-1-inch or larger sizes; and shall not contain more than two 90-degree bends or the equivalent. Pull or junction boxes shall be installed to comply with these limitations, whether or not indicated on the drawings. Bends in conduit, 1 inch and larger, shall have minimum inside radii of 12 times the nominal conduit diameter.

4.6.5 Conductors

4.6.5.1 Uninsulated conductors.- Uninsulated conductors shall be copper and in accordance with Federal Specification QQ-W-343.

4.6.5.2 Insulated conductors.- Unless otherwise indicated, insulated conductors shall be copper with thermoplastic or thermosetting insulation, type THW, THWN, and XHHW for general use, or type THHN for use in dry locations only, all insulated for 600 volts in accordance with Federal Specification J-C-30. Unless otherwise indicated, conductors No. 10 AWG and smaller shall be solid. Conductors No. 8 AWG and larger shall be

stranded. Minimum branch circuit conductor size shall be No. 12 AWG. Stranded conductors may be used with wire compression connectors or a pressure washer type lug; lugs with screw only compression are not allowed. Minimum control wire size shall be No. 14 AWG unless noted otherwise. Stranded conductors smaller than 10 AWG is allowed in applications where vibration and flexing may be encountered.

4.6.5.2.1 Fixture wiring.- Fixture wiring shall be thermoplastic insulated copper, rated for 600 volts, in accordance with Federal Specification J-C-30 and the NEC.

4.6.5.2.2. Color coding.- All feeder and branch circuits, including neutral conductors, shall be identified at both ends of the conductor with panel and circuit number indicated. This shall be accomplished using shrink embossed labels only. The color coding shall be continuous throughout the facility on each phase conductor to its point of utilization so that the conductor phase connection is readily identifiable. Equipment grounding conductors shall be color coded green. Conductors covered with green insulation with yellow, orange, violet or red tracers shall be used for other grounding systems. Neutral conductors shall be white insulated for 120/208/240 volt systems and gray insulated for 277/480 volt systems. For conductors, No. 4 AWG and larger, where appropriate insulation color is not available, color coded tape, half lapped for a minimum length of 3 inches shall be used. Switch leg conductors shall be violet insulated. Green, white, and gray insulated conductors shall not be reidentified. All conductor color codes including reidentified conductors shall be visible at all junction boxes, pullboxes, panelboards, outlets, switches, at access locations in closed raceways, every three (3) feet in open raceways, under all raised floors and at all terminations. Phase conductors shall be color coded as follows:

Single Phase

120 Volts	120/208/240 Volts
Line 1 - Black	Line 1 - Black
	Line 2 - Red
Neutral - White	Neutral - White

Three Phase

120/208/240 Volts	277/480 Volts
Phase A - Black	Phase A - Yellow
Phase B - Red	Phase B - Brown
Phase C - Blue	Phase C - Orange
Neutral - White	Neutral - Gray

Color coding for conductors in control cables shall be in accordance with NEMA Standard WC 5. DC power conductors. shall be color coded as follows: positive conductor, red with brown tracer; negative conductor, brown with red tracer; neutral conductors, if used, shall be white.

4.6.5.3 Splices.- Splices shall be made only at outlets , junction boxes or accessible raceways. Splicing of ungrounded conductors in panelboards is not permitted. Splices shall be made with solderless connectors conforming to UL 486A, UL 486C, AND UL 486E. Insulated wire nuts may only be used to splice conductors sized No. 10 AWG and smaller. Compression connectors shall be used to splice conductors No. 8 AWG and larger. All splices, including those made with insulated wire nuts, shall be insulated with electrical tape or shrink tubing to a level equal to that of the factory insulated conductors. All underground splicing shall be accomplished in accordance with FAA-C-1391.

NOTE:

Conductors in critical power systems shall not be spliced.

4.7 Boxes.- Boxes shall be either the cast-metal threaded-hub type conforming to UL 514A and UL514B, galvanized steel type conforming to UL 514A and UL 514B, or metal outlet boxes conforming to NEMA OS 1. All enclosures shall conform to NEMA standards.

4.7.1 Applications.- Boxes shall be provided in the wiring or raceway system for pulling wires, making connections, and mounting devices or fixtures. All outdoor boxes shall be rated minimum NEMA 3R. In hazardous areas, boxes shall be explosion proof. Each electrical outlet box shall have a machine screw which

fits into a tapped hole in the box for the ground connection. Boxes shall be sized in accordance with the NEC Article 370. Boxes for mounting lighting fixtures shall not be less than 4 inches square. Boxes installed for concealed wiring shall be provided with extension rings or plaster covers. The front edge of the box shall be flush or recessed not more than 1/4-inch from the finished wall surface. Boxes for use in masonry-block or tile walls shall be square-cornered tile-type, or standard boxes having square-cornered tile-type covers. Cast-metal boxes installed in wet locations and boxes installed flush with exterior surfaces shall be gasketed. Separate boxes shall be provided for flush or recessed fixtures where required by the fixture terminal operating temperature, and fixtures shall be readily removable for access to the boxes unless ceiling access panels are provided. Boxes for fixtures on suspended ceilings shall be supported independently of the ceiling supports. Boxes shall not be supported from sheet-metal roof decks. Non-metallic boxes may be used only with non-metallic raceway systems.

4.7.2 Supports.- Boxes and supports shall be securely fastened to wood with wood screws, nails, screw-type nails, carriage bolts, or lag screws of equal holding strength, with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screws or welded studs on steel work. Support systems shall be capable of carrying the weight of the box and its contents. Threaded studs driven by powder charge and provided with lockwashers and nuts, or nail-type nylon anchors may be used in lieu of expansion shields, or machine screws. In open overhead spaces, cast-metal boxes threaded to raceways need not be separately supported except where used for fixture support; cast-metal boxes having threadless connectors and sheet-metal boxes shall be supported directly from the building structure or by bar hangers. Where bar hangers are used, the bar shall be attached to raceways on opposite sides of the box and the raceway shall be supported with an approved fastener not more than 24 inches from the box. Penetration shall be no more than 1-1/2 inches into reinforced concrete beams nor more than 3/4-inch into reinforced concrete joists. Main reinforcing steel shall not be cut.

4.8 Wiring devices

4.8.1 Receptacles.- All receptacles shall be specification grade in accordance with NEMA STD WD-1. Unless otherwise indicated, general purpose duplex receptacles shall be specification grade, 20 ampere rating, 125 volt, grounding type NEMA 5-20R. Receptacles with push-in connections or a combination of screw-type and push-in connectors are not acceptable. Unless noted otherwise, receptacles shall be installed 12 inches above finished floor. All receptacles, unless they are of the isolated-ground type, shall be grounded by the installation of a green grounding pigtail from the receptacle grounding screw directly to the grounding screw on the outlet box where the green equipment grounding conductor is terminated.

NOTE: For all critical power circuits, the receptacles shall be twist lock type except where the receptacles are not subject to be kicked or bumped (e.g., receptacles mounted inside an equipment rack).

4.8.1.1 General.

4.8.1.2 Ground fault circuit-interrupter (GFCI) receptacles.- GFCI receptacles shall be installed in all locations required by the NEC and in other locations as indicated on the drawings. GFCI receptacles shall be 125-volt, duplex, UL Group I, Class A, rated for 20 amperes minimum. All exterior GFCI receptacles shall be mounted in weatherproof boxes with weatherproof covers.

4.8.1.3 Reserved

4.8.1.4. Isolated ground terminal receptacles.- When isolated ground terminal receptacles are shown in the contract documents, they shall be installed in accordance with Article 250-74 exception #4, of the NEC. Isolated ground terminal receptacles shall only be used where shown on the drawings. All isolated ground terminal receptacles shall be colored orange.

4.8.1.5 Plug-in strip outlets

4.8.1.5.1 General.- Fixed multi-outlet assemblies shall consist of a surface metal raceway with grounding type

receptacles. Phase and neutral conductors shall not be smaller than No. 12 AWG and shall have the type of insulation specified for branch circuit conductors. In addition, a No. 12 AWG or larger green insulated equipment grounding conductor having the same insulation as the phase conductors shall be installed. This grounding conductor shall connect all receptacle ground terminals and each section of the surface metal raceway, and shall be securely connected to the equipment grounding conductor from the branch power panel. Where more than one circuit is indicated as serving a group of similar receptacles in a common raceway, adjacent receptacles shall not be connected to the same circuit.

4.8.1.5.2 Associated hardware.- Surface metal raceways shall be provided with snap-on blank covers and/or snap-on receptacle covers for the receptacles furnished, all manufactured by the raceway manufacturer. They shall be installed to prevent open cracks. Where industry standard device plates are to be installed on raceways, snap-on blank covers shall be accurately cut to avoid open cracks. Fittings, elbows, clips, mounting straps, connection blocks, and insulators, shall be provided as required for a complete installation.

4.8.1.6 Emergency light receptacles.- Emergency light receptacles shall be grounding type single receptacles in accordance with NEMA standard WD 1.

4.8.2 Wall switches.- Single-pole and three-way wall switches shall be specification grade, rated 120/277 volts, and shall be fully rated 20 amperes, AC only. Wiring terminals shall be of the screw type. Switches with push-in connections or a combination of screw-type and push-in connections are not acceptable. Switches shall be equipped with grounding terminals and shall be grounded with a green grounding pigtail connected from the switch grounding screw directly to the grounding lug or screw on the outlet box where the green equipment grounding conductor is terminated. Switches shall be the quiet-operating type. Not more than one switch shall be installed in a single gang position.

4.8.3 Device plates.- Plates of the one-piece type shall be provided for all outlets and fittings to suit the devices installed. Plate screws shall be of metal with countersunk heads, in a color to match the finish of the

plate. Telephone and communication outlets shall be provided with a blank cover plate unless otherwise indicated. Plates shall be installed with all four edges in continuous contact with finished wall surfaces with the use of mats or similar devices. Plaster fillings will not be permitted. Plates shall be installed with an alignment tolerance of 1/16 inch. The use of sectional type device plates will not be permitted. Plates installed in wet locations shall be gasketed. Device plates for telephone and intercommunication outlets shall have a 3/8-inch bushed opening in the center or a dome-shaped grommet on the side.

4.8.4 Photoelectric control.- Unless otherwise indicated, photoelectric controls for floodlighting or obstruction lighting shall be 120 volt, 3000 watt, single-pole, single-throw, double-break type. Photoelectric controls shall be mounted in an appropriate weatherproof housings installed on the building exterior. The housing should be vented if possible, faced in a northerly direction. At no time shall the controllers be mounted in the same enclosure with thre batteries.

4.9 Service equipment

4.9.1 Power.- Service entrance equipment and installation for power shall be in accordance with the regulations of the local utility providing service and NEC Article 230.

4.9.1.1 Service entrance conduits.- Service entrance conduits shall be installed as shown on the drawings and shall be heavywall zinc coated rigid steel unless otherwise indicated. Grounding bushings shall be installed on both ends of the service entrance conduit.

4.9.1.1.1 Underground service.- Underground service entrance conduits shall be installed a minimum of 2 feet below finished grade. Service entrance conduit shall be electrically continuous between the service disconnecting means and the facility transformer housing. The conduit shall be bonded to the counterpoise.

4.9.1.1.2 Aerial service.- A minimum of 4 feet of slack in all service entrance conductors shall be extended from an appropriate weatherproof entrance fitting to permit connection to the service drop. Conduit shall be

concealed within the building where possible and conduit penetrations into the building shall be caulked with sealing compound.

4.9.1.2 Service disconnecting means.- Service equipment shall be a fused disconnect switch, separately mounted circuit breaker, or main circuit breaker in the main distribution panel. All switches and circuit breakers used as service entrance disconnecting means shall be UL rated for service equipment.

4.10 Panelboards

4.10.1 General.- Panelboards shall be dead-front type, shall conform to Federal Specification W-P-115, Type I, Class 1, and shall be listed by UL except for installations which require special panelboards to incorporate items not available as UL listed. Panelboards shall be mounted so that the height to the top of the panelboard shall not exceed 81 inches above the finished floor level. Unless otherwise specified, panelboards shall have a full hinged front cover with a hinged door in that cover for access to circuit breaker switches. Doors shall have flush type cylinder locks and catches. Doors over 48 inches in height shall have auxiliary fasteners on top and bottom. All locks in a project shall be keyed alike, and two keys shall be furnished with each lock. Directories shall be type written to indicate the load served by each circuit and shall be mounted on the inside of the door in a holder with a protective covering. Circuits shall be connected as indicated on the drawing. The directory shall be arranged so that the typed entries simulate circuit breaker positions in the panelboard.

4.10.2 Wiring gutters.- The minimum size of side wiring gutters shall be 4 inches for power feeders up to and including 100 amperes, 6 inches for power feeders over 100 amperes and up to 225 amperes, and 8 inches for power feeders over 225 amperes and up to 600 amperes.

4.10.3 Circuit breakers.- Circuit breaker ratings shall be in accordance with the SCA/PDC study, FAA Order 6950.27. All circuit breakers shall be UL listed thermal magnetic type or electronic solid state type, as described herein, and with a minimum rating of 10,000 AIC. Circuit breakers shall also have trip ratings,

voltage ratings, and number of poles as defined on the drawings. All circuit breakers shall have a trip indicating feature. Single-pole breakers shall be full-size modules. Two-pole and three-pole breakers shall be physically sized in even multiples of a single-pole breaker. Breakers shall be sized so that two single-pole breakers can not fit in a single housing. Multipole circuit breakers shall have an internal common trip mechanism. All circuit breakers and the panelboards in which the breakers are installed shall be products of the same manufacturer. Plug in type load centers and/or plug in type branch or feeder circuit breakers shall not be used. Positive integral locking plug-in circuit breakers, and associated panelboards, may be used.

4.10.3.1 Thermal magnetic.- All thermal magnetic breakers shall be quick make, quick break type conforming to Federal specification W-C-375. Adjustable breakers shall have setting adjustments readily accessible and visible from the front of the panel board, after installation.

4.10.3.2 Solid state.- Adjustable, solid-state or microprocessor-controlled circuit breakers shall have adjustments readily accessible and visible from the front of the panelboard, after installation. Individual circuit breaker frame size shall not exceed the panelboard bus rating.

4.10.3.3 Self enclosed circuit breakers

4.10.3.3.1 General.- Circuit breakers shall be UL listed thermal magnetic type or electronic solid state type, as described herein. Multiple circuit breakers shall have an internal common trip mechanism. Circuit breakers shall comply with Federal Specification W-C-375.

4.10.3.3.2 Thermal magnetic.- These circuit breakers shall be of the molded-case type, shall have a quick-make and quick-break toggle mechanism, inverse-time trip characteristics and shall be trip-free on overload or short-circuit. Automatic release shall be secured by a BI-metallic thermal element releasing the mechanism latch. In addition, a magnetic armature shall be provided to trip the breaker instantaneously for short-circuit currents above the overload range.

Automatic tripping shall be indicated by a handle position between the manual OFF and ON positions.

4.10.3.3.3 Solid state/microprocessor.- These circuit breakers may be used providing they meet or exceed the performance characteristics given by paragraph 4.10.3.3.2 above.

4.10.4 Bus bars.- All phase bus bars shall be copper or plated copper. Neutral and ground bus bars shall be copper or plated copper. Bus capacity shall be as indicated on the drawings. Where bus capacity is not indicated on the drawings, the capacity shall be equal to or greater than the panelboard feeder overcurrent protective device. Except as indicated paragraph 4.10.3, circuit breaker current-carrying connections shall be bolted. Bus bar connections to branch circuit breakers shall be of the sequence phase type. The neutral bus shall be insulated from all panelboards except where the panelboard is used as the service disconnecting means. Where "provisions for," "future," or "space" is noted on the drawings, the panelboard shall be equipped with bus connections for the future installation of circuit breakers.

4.10.4.1 Ground bus.- All panelboards shall have an uninsulated ground bus that is separate from the neutral bus. The ground bus shall be securely bonded to the cabinet and adequately sized for the panelboard capacity and with the number of terminations equal to the number of poles in the panelboard. The ground bus shall only be bonded to the neutral bus at the service disconnecting means. The ground bus bar shall be structurally integral to the panelboard or attached to the panelboard with a bolt, nut and lock washer. If the ground bus bar is mounted to the enclosures with screw threads only (i.e., tapped blind hole) a separate, bolted ground lug shall be installed on the panelboard and bonded to the ground bus bar. The bond conductor shall have the same current carrying capacity as the largest equipment grounding conductor terminated to the ground bus bar.

4.11 Reserved.

4.12 Safety switches.- Safety switches shall be type "HD," heavy duty, locking type unless otherwise indicated. Switches mounted in dry locations shall be

NEMA type 1 enclosures. Switches installed outdoors, or in damp locations shall be mounted in NEMA type 3R enclosures. Switches shall be of the voltage and current ratings indicated on the drawings. Switches shall be the quick-make, quick-break type. Except for ground lugs which shall be bonded to the housing, all parts shall be mounted on insulating bases to permit replacement of any part from the front of the switch. All current-carrying parts shall be of high-conductivity copper unless otherwise specified. Switch contacts shall be silver-tungsten or plated to minimize corrosion, pitting and oxidation. When used for motors a safety switch shall be sized in accordance with NEC Article 380. Switches shall disconnect all ungrounded conductors.

4.13 Cabinets.- Telephone and signal systems cabinets shall be constructed of zinc coated sheet steel in accordance with NEC Article 373-10, and shall meet the requirements of UL 50. Cabinets shall be constructed with interior dimensions not less than those indicated on the drawings. Cabinets shall be mounted so that the height to the top of the cabinet does not exceed 81 inches above the finished floor level. A locking catch and two keys shall be provided with each cabinet unless otherwise indicated. All locks in a project shall be keyed alike. Cabinets shall also be provided with a 5/8-inch plywood backboard unless otherwise indicated.

4.14 Motors and controls

4.14.1 Motors.- Motors furnished under this specification shall be of sufficient size for the duty to be performed, and shall not exceed the full-load rating when the driven equipment is operating at specified capacity. Motors shall be rated for the voltage of the system to which they are to be connected. Unless otherwise indicated, all motors shall have open frames, and continuous-duty classifications. Polyphase motors shall conform to NEMA Standard MG-1, and shall be type II, class 3, minimum insulation class B, squirrel-cage type, having normal starting-torque and low-starting-current characteristics, unless otherwise specified. When motor horsepower ratings are indicated on electrical drawings, these ratings are only approximate. Higher ratings may be required to adequately power driven equipment selected by the contractor for the duty to be performed.

4.14.2 Motor controls.- Each motor, 1/8 horsepower or larger, shall have overload protection in each phase, or other equally rated method in accordance with the NEC. The overload-protection device shall be provided either integral with the motor, or with the control, or shall be mounted in a separate enclosure. In any case the reset button shall be in an accessible location. Unless otherwise indicated, the protective device shall be of the manual reset type. Single or double-pole tumbler switches specifically designed for AC operation may be used as manual controllers for single-phase motors having a current rating not in excess of 80 percent of the switch rating. Automatic control devices such as thermostats and float or pressure switches may control the starting and stopping of motors directly, provided the devices used are designed for that purpose and have an adequate horsepower rating. When the automatic control device operates the motor directly, a double-throw, three-position tumbler or rotary switch shall be provided for manual control.

4.14.2.1 Reduced-voltage controllers.- Reduced voltage starting methods when required shall be as indicated on the drawings.

4.14.3 Motor disconnecting means.- Each motor shall be provided with a disconnecting means and a manually operated switch as shown on the drawings or when required by the NEC. For single-phase motors, a single-pole or double-pole toggle switch, rated only for AC, will be acceptable for capacities less than 30 amperes, provided the ampere rating of the switch is at least 125 percent of the motor full load amperages (FLA). Enclosed safety switches shall conform with paragraph 4.12 above.

4.15 Dry-type transformers

4.15.1 General.- Dry-type transformers shall be of the sizes and characteristics shown on drawings. Unless otherwise indicated, the design, manufacture, and testing of dry-type transformers, and the methods of conducting tests and preparing reports shall be in accordance with NEMA ST 20, and UL standards. These transformers shall be dry-type self-cooled (Class AA) as defined by ANSI/IEEE C57.12.80. Unless otherwise indicated, minimum Basic Insulation Levels (BIL) shall be in accordance with IEEE STD 141.

4.15.2 Windings and taps.- Dry-type transformers shall be provided with separate primary and separate secondary windings for each phase. The transformers shall be provided with copper windings. Unless otherwise indicated, each primary winding of each transformer rated 15 KVA and greater shall be provided with four taps, two of which shall provide 2-1/2 percent increments above full rated voltage and two of which shall provide 2-1/2 percent increments below full rated voltage. Each primary winding of each transformer rated below 15 KVA shall, be provided with not less than two taps, each providing a 5 percent increment above and below full rated voltage.

4.15.3 Insulation.- Insulation provided in transformers having ratings not exceeding 25 KVA shall have 185°C rise rating. Insulation provided in transformers having ratings exceeding 25 KVA shall have 220°C rise rating.

4.15.4 Terminal compartments.- Each dry-type transformer shall be provided with a suitable terminal compartment to accommodate the required primary and secondary wiring connections, and side or bottom conduit entrance. Transformers having ratings not exceeding 25 KVA shall be provided with terminal leads equipped with factory installed and supported connectors. Transformers rated greater than 25 KVA shall have terminal boards equipped with factory installed clamp-type connectors. The terminal compartment temperature shall not exceed 75°C when the transformer is operating continuously at rated load with an ambient temperature of 40°C.

4.15.5 Sound pressure levels and vibration isolation.- Sound pressure levels of dry-type transformers shall be determined in accordance with NEMA Standard ST 20. Levels shall not exceed 40 db for transformers rated at 9 KVA or less; 45 db for transformers rated over 9 KVA but not over 50 KVA; and 50 db for transformers rated over 50 KVA but not over 150 KVA. All dry-type transformers 45 KVA and greater shall have integral vibration isolation supports between the core and coil assembly and the transformer enclosure. Transformers of lesser rating shall have either integral or external vibration isolation supports. Conduit connections to transformers shall be made with flexible metal conduit, nominally 12 inches length but not more than 36 inches in length.

4.15.6 Enclosures.- Single-phase transformers larger than 25 KVA and three-phase transformers larger than 15 KVA shall be fully encased in steel enclosures. Transformers smaller than 15 KVA shall be fully encased in steel enclosures with or without compound fill, or shall have exposed cores, impregnated windings, and steel enclosures encircling all live parts. Enclosures shall be bonded to the grounding system. The surface temperature of the transformer shall not exceed 65°C when the transformer is operating continuously at rated load with an ambient temperature of 40°C.

4.15.7 Mounting.- Transformers shall be mounted to allow for adequate ventilation. Unless otherwise indicated on drawings, dry-type transformers having ratings not exceeding 25 KVA shall be suitable for wall mounting. Shop drawings of wall brackets and platforms for transformers shall be submitted for approval.

4.16 Identification.- Motor controllers, panelboards, safety switches and self-enclosed circuit breakers shall be identified with a name plate showing the functional name of the unit, voltage utilized, the number of phases, and other pertinent formation. Switches for local lighting need not be identified. Additional equipment shall be identified if called for on the drawings.

4.16.1 Name plates.- Name plates shall be non-ferrous metal or rigid plastic, stamped, embossed or engraved with 3/8-inch minimum height characters. The plates shall be secured to the equipment with a weather-proof bonding material or a minimum of two screws.

4.17 Fuses.- A complete set of fuses shall be installed and one set of spares shall be furnished for each fusible device. Time and current tripping characteristics of fuses serving motors or connected in series with circuit breakers shall be determined by the facility Protective Device Coordination Study (PDC). Fuses shall have a voltage rating not less than the circuit voltage. Required fuse interrupting ratings, determined by the Short Circuit Analysis (SCA) calculations, shall be as shown on the drawings, except that these interrupting ratings shall not be less than 100,000 amperes in branch and feeder circuits, and not less than 200,000 amperes in a service entrance switch.

4.18 Lamps and lighting fixtures

4.18.1 General.- Lamps and lighting fixtures shall be of the types indicated on the drawings. All lighting fixtures shall be UL approved and shall bear the UL label. All incandescent lamps shall be rated for 130 volts unless otherwise indicated. Flexible metal conduit, minimum 3/8 inch nominal trade size is permitted. External bonding jumpers are not required across the lighting fixture flexible conduit.

4.18.2 Fluorescent fixtures.- Unless otherwise indicated, fluorescent fixture lenses shall be the prismatic-type, made of virgin acrylic. Fluorescent lamps shall be rapid start, cool white unless otherwise indicated. Ballasts for fluorescent fixtures shall be class P, protected (including inherent automatic thermal reset and fuse) rapid start, high power factor type, conforming to UL Standard UL 935. Unless otherwise indicated, all ballasts shall be provided with factory installed choke-type radio frequency interference suppressers. Lampholders shall have silver plated contacts, and shall conform to standard UL 542.

4.18.2.1 Recessed fluorescent fixtures.- Recessed fluorescent fixtures shall conform to NEC Article 410-64 through 410-72, and shall be installed in suspended ceiling openings. These fixtures shall have adjustable fittings to permit alignment with ceiling panels.

4.18.2.2 Suspended fluorescent fixtures.- Pendant-mount fluorescent fixtures shall conform to Federal Specification W-F-414 and shall be of the types indicated on the drawings. Single-unit suspended fluorescent fixtures shall have twin-stem hangers. Multiple-unit or continuous row fluorescent units shall have tubing or a stem for wiring at one point, and tubing or a stem suspension provided for each unit length of chassis, including one at each end.

4.18.3 Suspended incandescent fixtures.- Pendant-mounted incandescent fixtures shall be provided with swivel hangers to insure a plumb installation.

4.18.4 Emergency lights.- Emergency lights shall conform to Federal Specification W-L-305, type I, class I, style D or E, with the number of heads as indicated on the

drawings. Emergency light sets shall be connected to the wiring system by a cord no more than 3 feet in length to a single receptacle.

4.18.5. High intensity discharge (HID) lamps.- HID lamps including mercury vapor, metal halide, and high or low pressure sodium shall be as indicated on the drawings. High power factor, constant wattage ballasts shall be furnished with HID lamps. Mercury vapor lamps shall be the color improved type.

4.19 Signal and communications

4.19.1 Entrance conduits.- Conduit materials shall be RSC unless otherwise indicated. Except where otherwise indicated, underground conduits shall be a minimum of 2 feet below finished grade and extend at least 5 feet beyond the grounding electrode system. The conduits shall be bonded to the grounding electrode system with No. 2 AWG bare copper conductor by exothermic welds or FAA-approved pressure connectors. Conduits installed for future use by others, such as for telephone, communications, electronic signals, etc., shall have both ends capped.

4.19.2 Transient protection demarcation box for electronic landlines.- A metallic, appropriately rated NEMA junction box, shall be installed where electronic landlines or conduits enter the facility. This box will house terminal boards, cables, and circuit transient protectors as shown on the contract drawings.

4.19.3 Fiber optics.- The use of fiber optics is recommended to replace metallic, control cables. Using fiber optics will eliminate outages and loss of service due to lightning strikes.

4.20 Painting and finishing.- Where factory finishes are not adequate to protect metal surfaces from corrosion, the contractor shall paint exposed surfaces prior to or after installation. All marred or damaged surfaces, except exposed metal for grounding purposes, shall be refinished to leave a smooth, uniform finish at final inspection.

4.21 Repair of existing work.- Electrical work shall be carefully planned. Where cutting, channeling, chasing,

or drilling of floors, wall partitions, ceilings, or other surfaces is necessary for the proper installation, support, or anchorage of the conduit, raceways, or other electrical work, it shall be carefully done. The contractor shall repair, with equal material by skilled workers, any damage to facilities caused by the contractor's workers or equipment. Contracting Officer's prior approval must be obtained for the materials, workers, time of day or night, repair method, and for temporary or permanent repairs purposes. On completion, repair work shall be inspected and approved by the Contracting Officer with the concurrence of any other affected parties such as utility companies and airport authorities.

5. QUALITY ASSURANCE PROVISIONS

5.1 List of materials and equipment.- When required by the contract the contractor shall submit a list of materials and equipment to the Contracting Officer for approval.

5.1.1 Information required.- This list shall include manufacturer's style or catalog numbers. Partial lists submitted from time to time shall not be considered as fulfilling this requirement. Approval of materials will be based on manufacturer's published data. Approval of materials and equipment will be tentative, subject to submission of complete shop drawings, when required, indicating compliance with the contract documents.

5.1.2 Statement.- A manufacturer's statement indicating complete compliance with the applicable federal specification, military specification, or standards of ASTM, NEMA, or other commercial standard, is acceptable as indicating compliance with contract documents.

5.2 Shop drawings.- When required by the contract or by direction of the contracting officer, the contractor shall submit shop drawings for materials and equipment not completely identified by information submitted in the materials and equipment lists. This information shall include, but is not limited to panelboards, lighting fixtures, cable trays, switchgear, transformers, busways, cabinets, and lightning protection systems. In addition, the contractor shall provide the completed Short Circuit

Analysis/Protective Device (SCA/PDC) study, FAA Order 6950.27.

5.2.1 Coordination.- Drawings and submitted data shall be checked and coordinated with the work of other construction trades involved, before they are submitted for approval, and shall bear the contractor's stamp of approval as evidence of such checking and coordination.

5.2.2 Required data.- Drawings and submitted data shall be complete, assembled in sets and shall bear the date, drawing revision number, name of project or facility, name of contractor and subcontractor, and the clear identity of contents and location of work.

5.2.3 Approval.- The approval of drawings and submitted data shall not be construed as (1) permitting any departure from the contract requirements; (2) relieving the contractor of the responsibility for any errors, including details, dimensions, materials, etc.; or (3) approving departures from full size details furnished by the Contracting Officer.

5.2.4 Variations.- If drawings show variations from the contract requirements because of standard shop practice or for other reasons, the contractor shall describe such variations in a letter of transmittal to the Contracting Officer. If acceptable, the Contracting Officer may approve any or all such variations, subject to a proper adjustment in the contract. Contractors failing to describe such variations shall not be relieved of the responsibility for executing the work in accordance with the contract, even though such drawings have been approved.

5.2.5 Submission.- The contractor shall submit and obtain approval of shop drawings by the Contracting Officer before ordering materials or proceeding with any work associated with the shop drawings.

5.3 Tests

5.3.1 General.- Unless otherwise indicated, the contractor shall furnish all test instruments, materials and labor necessary to perform the following tests. All tests shall be performed in the presence of the Contracting Officer or his designated representative.

All instruments shall have been calibrated within a period of two years preceding testing. Calibrations shall be traceable to applicable industry recognized standards.

5.3.2 Cables.- All cables shall be tested in accordance with FAA Order 6950.22 prior to installation and again upon completion of the installation. All testing shall be accomplished before connection is made to any existing equipment.

5.3.3 Load balancing.- After the electrical installation has been completed, the contractor shall take current readings with a true RMS ammeter for the purpose of load balancing. These readings shall be taken at the service entrance, each feeder panelboard, each branch panelboard, and each separately derived source. The contractor shall redistribute single-phase loads where there is greater than a 20% difference between readings in any two phases. The contractor shall also be required to notify the Contracting Officer of current readings taken before and after installation, and any phase loaded above 80% of the rating of its overcurrent protective device.

5.3.4 Insulation resistance tests.- Feeder and branch circuit insulation tests shall be performed after installation, but before connection to fixtures or appliances. Motors shall be tested for grounds or short circuits after installation but before start-up. All conductors shall test free from short circuits and grounds, and have a minimum phase-to-phase and phase-to-ground insulation resistance of 30 megohms when measured with a 500-volt DC insulation resistance tester. Apply the test voltage for at least one minute after the meter reading has stabilized. The contractor shall submit a letter type test report to the Contracting Officer prior to final FAA inspection of the contractor's work. The report shall list the tests performed and results obtained.

5.3.5 Neutral isolation tests.- For all new installations, the neutral in the service entrance switch shall be tested for isolation from ground with an ohmmeter capable of reading greater than 20,000 ohms. This procedure to be used is detailed in the Appendix. This procedures can also be used to determine if there

are any other neutral-ground connections on the load side of the service disconnecting means.

5.3.6 Earth resistance test.- To demonstrate compliance with paragraph 4.4.4, the contractor shall measure the resistance of the grounding electrode system. Tests shall not be conducted within 48 hours of a rainfall or in frozen soil. The contractor shall immediately notify the Contracting Officer if the specified resistance is not obtained. Upon project completion, the contractor shall also submit a written test report to the Contracting Officer, defining the test procedure and results obtained.

5.3.7 Operating test.- After the interior wiring system installation is completed, and at such time as the Contracting Offer may direct, the contractor shall conduct an operating test for approval. The equipment shall be demonstrated to operate in accordance with the requirements of this specification. The test shall be performed in the presence of the Contracting Officer or designated representative.

6. NOTES

6.1 General.- This specification is to be used as part of the contract documentation for construction and facility modification projects that do not require major design efforts. No waivers to contractors, other than those indicated as alternatives, are allowed. This specification is not to be used as a design guide. For design information, consult FAA-STD-019, Lightning Protection, Grounding, Bonding and Shielding Requirements for Facilities; FAA-STD-020, Transient Protection, Grounding, Bonding and Shielding Requirements for Equipment; FAA Order 6950.19, Practices and Procedures for Lightning Protection, Grounding, Bonding, and Shielding Implementation; FAA Order 6950.20, Fundamental Considerations for Lightning Protection, Grounding, Bonding and Shielding and other documentation as applicable.

6.2 Conflicts between documents.- In all but the smallest of modification or construction contracts, conflicts are unavoidable between the various documents cited in the contract or referenced in an included specification. Any proposal request using this document

should contain the following provisions: "Prospective contractors shall, as part of their proposals, enumerate, identify, and list conflicts that exist with the contract documents, and between those documents and the rules, regulations, and codes of the local utility company and local, county or state governing bodies."

Appendix

FACILITY NEUTRAL/GROUND ISOLATION TESTING.

The following testing is to be utilized to verify required isolation between facility neutral and ground systems within the electrical distribution system and facility equipment. Neutral grounding at the service entrance disconnect means is still required by NFPA, NEC Article 250.

EQUIPMENT NEEDED: Volt-ohm meter, flash light, allen wrenches, screw drivers, socket wrenches, and wire markers.

NOTE 1: A resistance value of greater than 20,000 ohms is the minimum value for an acceptable neutral/ground isolation test. Any lesser value indicates an unacceptable isolation condition that must be investigated.

NOTE 2: Capacitors on the neutral line or capacitive effects of the distribution system will impact resistance readings. Always use the final, stabilized readings.

NOTE 3: High impedance meters are susceptible to acting as an antenna, picking up stray fields that would not be picked up by lower impedance meters. For this series of tests, it is highly recommended that low impedance meters be used, such as an analog meter the Simpson 260 or its equivalent, or use a digital meter the Fluke 8060a series or its equivalent.

STEPS:

1. Schedule a facility outage in order to conduct the tests.

2. Review one-line diagrams of the facility electrical distribution system.

3. Isolate and lock out all standby power sources.

4. Remove facility power by opening the service disconnect means.

CAUTION: Voltage is still present at the supply side (line side) of the service entrance disconnect.

5. Verify that no voltage is present at the load side of the service disconnect means with the voltmeter using progressively lower scales.

6. Open all circuit breakers in the facility distribution system.
7. Disconnect load side neutral conductor(s).

8. Measure resistance between disconnected load side neutral conductor(s) and the service entrance enclosure ground bus.

9. If resistance reading is acceptable, reconnect neutral conductor(s) and terminate testing.

10. If resistance reading is unacceptable, tag the grounded neutral conductor(s) and leave the conductor(s) disconnected.

11. Trace the tagged conductor(s) to the load and correct the unacceptable neutral/ground bond, or to the next downstream (towards the load) neutral termination.

12. At the next downstream location, remove each load side neutral conductor one at a time and measure resistance between the conductor and the enclosure. If the resistance reading is acceptable, re-terminate the conductor. If the resistance reading is unacceptable, tag the grounded neutral conductor and leave it disconnected. Measure resistance of the rest of the neutral bus immediately after identifying a grounded conductor, to possibly verify the rest of the bus as acceptable.

13. Continue downstream as described above until all unintentional neutral/ground bonds are found and corrected.

14. Reconnect all neutral conductor(s) except at the service entrance disconnect means. Measure resistance between the load side neutral conductor(s) and the service entrance enclosure to verify successful isolation of neutral/ground conductors.

15. Reconnect neutral conductor(s), close service entrance disconnect means.

16. Place standby power source on line.

General Decision Number: IL120008 04/06/2012 IL8

Superseded General Decision Number: IL20100008

State: Illinois

Construction Types: Building and Residential

Counties: Du Page, Grundy, Kane, Kendall, Lake, McHenry and Will Counties in Illinois.

BUILDING AND RESIDENTIAL PROJECTS (does not include landscape projects).

Modification Number	Publication Date
0	01/06/2012
1	01/13/2012
2	02/03/2012
3	03/02/2012
4	04/06/2012

ASBE0017-005 06/01/2011

	Rates	Fringes
ASBESTOS WORKER/INSULATOR includes the application of all insulating materials, protective coverings, coatings, and finishes to all types of mechanical systems	$ 43.80	23.40
Fire Stop Technician	$ 35.04	22.20
HAZARDOUS MATERIAL HANDLER includes preparation, wetting, stripping, removal, scrapping vacuuming, bagging and disposing of all insulation materials from mechanical systems, whether they contain asbestos or not	$ 32.85	22.20

BOIL0001-003 07/01/2010

DU PAGE, GRUNDY, KANE, KENDALL, LAKE, MCHENRY, AND WILL COUNTIES

	Rates	Fringes
BOILERMAKER	$ 42.67	19.60

BRIL0014-001 06/01/2011

DU PAGE, GRUNDY, LAKE, and WILL COUNTIES

	Rates	Fringes
BRICKLAYER	$ 39.78	20.80

BRIL0021-002 06/01/2010

	Rates	Fringes
MARBLE SETTER	$ 39.03	19.90

BRIL0021-008 06/01/2011

	Rates	Fringes
TERRAZZO WORKER/SETTER	$ 39.01	19.11
TILE FINISHER	$ 33.60	15.22
TILE SETTER	$ 40.49	16.93

BRIL0021-010 06/01/2009

	Rates	Fringes
MARBLE FINISHER	$ 29.10	19.90

BRIL0027-002 06/01/2011

KANE, KENDALL, and MCHENRY COUNTIES

	Rates	Fringes
BRICKLAYER	$ 39.78	20.80

CARP0555-004 12/01/2010

Residential

DU PAGE and LAKE COUNTIES

	Rates	Fringes
CARPENTER	$ 33.37	22.12

CARP0555-005 07/01/2010

BUILDING

DUPAGE and LAKE COUNTIES

	Rates	Fringes
CARPENTER	$ 40.77	22.12

CARP0555-006 07/01/2010

WILL COUNTY

BUILDING

	Rates	Fringes
Carpenter; Millwright; Piledrivermen	$ 40.77	24.44

CARP0555-007 12/01/2010

WILL COUNTY

RESIDENTIAL

	Rates	Fringes

CARPENTER.....$ 33.37 22.12

CARP0555-009 07/01/2010

KANE, KENDALL, AND McHENRY COUNTIES

BUILDING

	Rates	Fringes
CARPENTER		
Carpenter, Floor Layer, Lather, Millwright, and Piledriver	$ 40.77	22.13

CARP0555-010 12/01/2010

KANE, KENDALL, and McHENRY COUNTIES

RESIDENTIAL

	Rates	Fringes
CARPENTER	$ 33.37	22.12

CARP0555-012 12/01/2010

GRUNDY COUNTY

	Rates	Fringes
CARPENTER		
Carpenter, Millwright, Piledriver, and Soft Floor Layer	$ 40.77	22.13
Residential	$ 33.37	22.12

ELEC0009-002 05/29/2011

WILL COUNTY

	Rates	Fringes
Line Construction		
Groundman	$ 32.64	19.76
Lineman and Equipment Operator	$ 41.85	25.36

ELEC0117-002 11/29/2010

KANE (Northern Half) and McHENRY COUNTIES

	Rates	Fringes
ELECTRICIAN		
Building	$ 43.08	23.51
Residential	$ 41.40	21.30

ELEC0117-003 05/30/2011

KANE (Northern Half), and McHENRY COUNTIES

	Rates	Fringes

ELECTRICIAN
ELECTRICAL TECHNICIAN.....$ 35.77 21.89

Work includes the installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network).The work shall cover the pulling of wire in raceways, but not the installation of raceways.

ELEC0150-002 05/31/2011

LAKE COUNTY

	Rates	Fringes
ELECTRICIAN		
Building & Residential	$ 39.15	26.27

ELEC0150-003 05/31/2011

LAKE COUNTY

	Rates	Fringes
ELECTRICIAN		
ELECTRICAL TECHNICIAN	$ 34.65	22.01

Work includes the installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network).The work shall cover the pulling of wire in raceways, but not the installation of raceways.

ELEC0176-003 06/01/2011

Grundy and Will Counties

	Rates	Fringes
ELECTRICIAN		
Residential	$ 37.50	14.81

ELEC0176-008 06/01/2011

GRUNDY and WILL COUNTIES

	Rates	Fringes
ELECTRICIAN		
Building	$ 39.50	29.95

ELEC0176-015 06/01/2011

GRUNDY and WILL COUNTIES

	Rates	Fringes
ELECTRICIAN		
ELECTRICAL TECHNICIAN	$ 32.40	22.37

Work includes the installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network).The work shall cover the pulling of wire in raceways, but not the installation of raceways.

ELEC0461-002 08/30/2010

KANE (Southern Half) AND KENDALL COUNTIES

	Rates	Fringes
ELECTRICIAN		
Building	$ 43.37	22.12
Residential	$ 41.34	21.36

ELEC0461-005 05/30/2011

KANE (Southern Half), AND KENDALL COUNTIES

	Rates	Fringes
ELECTRICIAN		
ELECTRICAL TECHNICIAN	$ 35.28	58.54%

Work includes the installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network).The work shall cover the pulling of wire in raceways, but not the installation of raceways.

ELEC0701-002 05/30/2011

DUPAGE COUNTY

	Rates	Fringes
ELECTRICIAN		
Building	$ 36.20	30.58
Residential	$ 35.25	27.43

ELEC0701-003 05/30/2011

DU PAGE COUNTY

	Rates	Fringes

ELECTRICIAN
ELECTRICAL TECHNICIAN.....$ 32.65 24.72

Work includes the installation, maintenance and removal of telecommunication facilities (voice, sound, data and video), telephone, security, fire alarm systems that are a component of a multiplex system and share a common cable, and data inside wire, interconnect, terminal equipment, central office, PABX and equipment, micro waves, V-SAT, bypass, CATV, WAN, (wide area networks), LAN (Local area networks), and ISDN (integrated system digital network).The work shall cover the pulling of wire in raceways, but not the installation of raceways.

ELEV0002-001 01/01/2012

DU PAGE, GRUNDY, KANE, KENDALL, LAKE, and WILL COUNTIES

	Rates	Fringes
ELEVATOR MECHANIC	$ 48.56	23.535+a+b

FOOTNOTES:

A. PAID HOLIDAYS: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Day after Thanksgiving Day; Veterans' Day and Christmas Day.

B. Employer contributes 8% of regular hourly rate as vacation pay credit for employee who has worked in business more than 5 years, and 6% for employee who has worked in business less than 5 years.

ELEV0132-004 01/01/2012

McHENRY COUNTY

	Rates	Fringes
ELEVATOR MECHANIC	$ 44.94	23.535+a+b

FOOTNOTES:

A . Eight paid holidays: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; Day after Thanksgiving; Veterans' Day and Christmas Day.

B. Employer contributes 8% of regular hourly rate as vacation pay credit for employee who has worked in business more than 5 yrs, and 6% for employee who has worked in business less than 5 yrs.

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* ENGI0150-026 06/01/2011

BUILDING and RESIDENTIAL

		Rates	Fringes
OPERATOR:	Power Equipment		
GROUP	1	$ 45.10	27.10
GROUP	2	$ 43.80	27.10
GROUP	3	$ 41.25	27.10
GROUP	4	$ 39.50	27.10

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Mechanic; Asphalt Plant*; Asphalt Spreader; Autograde*; Backhoes with Caisson attachment*:Batch Plant*; Benoto(Requires two Engineers); Boiler and Throttle Valve; Caisson Rigs*; Central Redi-Mix Plant*; Combination Backhoe Front Endloader Machine; Compressor and Throttle Valve; Concrete Breaker (Truck Mounted)*; Concrete Conveyor; Concrete Conveyor, Truck Mounted; Concrete Paver over 27E cu. ft.*; Concrete Paver 27E cu ft and Under*; Concrete Placer*; Concrete Placing Boom; Concrete Pump (Truck Mounted); Concrete Tower; Cranes*; Cranes, Hammerhead*; Cranes, (GCI and similar type Requires two operators only); Creter Crane; Crusher, Stone, etc; Derricks; Derricks, Traveling*; Formless Curb and Gutter Machine*; Grader, Elevating; Grouting Machines; Highlift Shovels or Front Endloader 2 1/4 yd. and over; Hoists, Elevators, Outside Type Rack and pinion and similar Machines; Hoists, One, Two, and Three Drum; Hoists, Two Tugger One Floor; Hydraulic Backhoes*; Hydraulic Boom Trucks; Hydraulic Vac (and similar equipment);Locomotives; Motor Patrol*; Pile Drivers amd Skid Rig*; Post Hole Digger; Pre- Stress Machine; Pump Cretes Dual Ram(Requiring frequent Lubrication and Water); Pump Cretes; Squeeze Cretes-Screw Type Pumps Gypsum Bulker and Pump; Raised and Blind Hole Drill*; Roto Mill Grinder (36" and Over)*; Roto Mill Grinder (Less Than 36")*; Scoops-Tractor Drawn; Slip-Form Paver*; Straddle Buggies; Tournapull; Tractor with Boom, and Side Boom; and Trenching Machines*.

GROUP 2: Bobcat (over 3/4 cu yd); Boilers; Brick Forklift; Broom, Power Propelled; Bulldozers; Concrete Mixer (Two Bag and over); Conveyor, Portable; Forklift Trucks; Greaser Engineer; Highlift Shovels or Front End loaders under 2 1/4 cu yd; Aotomatic Hoists, Hoists, Inside Elevators; Hoists, Sewer Dragging Machine; Hoists, Tugger Single Drum; Laser Screed; Rock Drill (Self-Propelled); Rock Drill (Truck Mounted)*; Rollers; Steam Generators; Tractors; Tractor Drawn Vibratory Roller (Receives an additional $.50 per hour); Winch Trucks with "A" Frame.

GROUP 3: Air Compressor-Small 250 and Under (1 to 5 not to exceed a total of 300 ft); Air Compressor-Large over 250; Combination-Small Equipment Operator; Generator- Small 50 kw and under; Generator-Large over 50 kw; Heaters, Mechanical; Hoists, Inside Elevators (Remodeling or Renovatin work); Hydrualic Power Units (Pile Driving, Extracting, and Drilling); Low Boys; Pumps Over 3" (1 To 3 not to exceed a total of 300 ft); Pumps, Well Points; Welding Machines (2 through 5); Winches, 4 Small Electric Drill Winches; Bobcat (up to and including 3/4 cu yd)

GROUP 4 - Bobcats and/or other Skid Steer Loaders; Brick Forklifts; Oilers *-Requires Oiler

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* IRON0001-014 06/01/2011

DU PAGE (Eastern 1/4), LAKE, AND MCHENRY (Hebron, Woodstock, and East thereof) COUNTIES

	Rates	Fringes
IRONWORKER		

Sheeter	$ 41.00	32.94
Structural and Reinforcing	$ 40.75	32.94

IRON0063-003 06/01/2011

LAKE, DUPAGE (Eastern 1/4) and McHENRY (HEBRON, WOODSTOCK & EAST THEREOF) COUNTIES

	Rates	Fringes
IRONWORKER, ORNAMENTAL	$ 40.20	28.78

IRON0063-004 06/01/2011

LAKE, DUPAGE (Eastern 1/4), and McHENRY (HEBRON, WOODSTOCK & EAST THEREOF) COUNTIES

	Rates	Fringes
IRONWORKER		
Fence Erector	$ 32.66	21.35

IRON0136-002 07/01/2011

LAKE, DUPAGE (Eastern 1/4) and McHENRY (HEBRON, WOODSTOCK & East thereof) COUNTIES

	Rates	Fringes
IRONWORKER		
Machinery Movers; Riggers;		
Machinery Erectors	$ 35.44	27.67
Master Riggers	$ 37.94	27.67

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* IRON0393-002 06/01/2011

DUPAGE (REMAINDER), KANE, KENDALL (NORTHERN PART), and MCHENRY (SOUTHEAST 1/4) COUNTIES

	Rates	Fringes
IRONWORKER	$ 44.95	26.98

IRON0444-002 06/01/2011

DUPAGE (ARGONNE & VIC), GRUNDY, KENDALL (Southern Part), and WILL COUNTIES

	Rates	Fringes
IRONWORKER	$ 39.00	29.36

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* IRON0498-006 06/01/2011

McHENRY COUNTY (Northwest Part)

	Rates	Fringes
IRONWORKER	$ 35.00	28.54

LABO0002-003 06/01/2011

DU PAGE COUNTY

	Rates	Fringes
LABORER		
GROUP 1	$ 35.20	21.45
GROUP 2	$ 35.20	21.45
GROUP 3	$ 35.275	21.45
GROUP 4	$ 35.30	21.45
GROUP 5	$ 35.35	21.45
GROUP 6	$ 35.40	21.45
GROUP 7	$ 34.425	21.45
GROUP 8	$ 35.475	21.45
GROUP 9	$ 35.55	21.45
GROUP 10	$ 35.65	21.45
GROUP 11	$ 35.475	21.45
GROUP 12	$ 36.20	21.45

LABORER CLASSIFICATIONS

GROUP 1: Building laborers, Plasterer tenders, Pumps for Dewatering & other Unclassified Laborers

GROUP 2: Fireproofing and fire shop laborers

GROUP 3: Cement gun laborers and hose

GROUP 4: Chimney over 40 feet; Scaffold laborers; Weldman-wreckers Burners

GROUP 5: Cement gun nozzle (gunite) laborers; Windlass and capstan person

GROUP 6: Stone derrickmen and handlers

GROUP 7: Jackhammermen, Power driven concrete saws and other power equipment

GROUP 8: Firebrick & boiler laborers

GROUP 9: Chimney on fire brick; Caisson Diggers; Well Point system men

GROUP 10: Boiler setter plastic laborers

GROUP 11: Jackhammermen on fire brick work only

GROUP 12: Dosimeter (any device) monitoring nuclear exposure); Asbestos abatement laborers; Toxic and Hazardous waste removal laborers

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LABO0075-001 06/01/2011

GRUNDY AND WILL COUNTIES

	Rates	Fringes
LABORER		
GROUP 1	$ 35.20	21.45
GROUP 2	$ 35.30	21.45
GROUP 3	$ 35.40	21.45

GROUP 4	$ 35.45	21.45
GROUP 5	$ 35.70	21.45
GROUP 6	$ 36.05	21.45
GROUP 7	$ 36.20	21.45

LABORER CLASSIFICATIONS

GROUP 1 - Mortar mixers, handling asphalt shingles; Scaffolds; Sewer and trench work (ground level down to 8 feet); Catch basin and manhole diggers, mesh handling on road work; Cement and mineral filler handler; Concrete puddlers; Batch dumpers (cement & asphalt); Vibrator operators; Sand and stone wheelers to mixer Handlers); Concrete wheelers; Airtamping hammermen; Concrete & paving breakers; Rock drillers/Jackhammermen; Chipping hammermen 1-Bag mixer; Asphalt laborer; Chain and power saws; Pit men; Fencing laborers; Mason tenders (mortar and brick wheeler); Kettlemen & tarmen, tank cleaners; Scaffold and staging laborers; Pot Firemen (tarmen); Heaters tender for any purpose; Water pumps (portable water pumps shall be tended by laborers if the employer determines tending is required); Rip rap; Handling of slab steel road forms in any manner, except road form setting, setting center strips, Contraction and expansion joints (road work); Unloading and handling of lumber, brick, transite materials, cast iron water pipe, reinforced concrete rods, sewer and drain tile, railroad tiles and all other creosoted materials; paving blocks and concrete forms; Handling of insulation of any type; all work involving the unloading of materials, fixtures, or furnishing, whether crated or uncrated; all mortar and composition mixers of sewer work; track laborers; Chimney and silo laborers working at a height of 1 to 48 feet; All laborers working on swinging suspended, or any type or make of scaffolding 1 to 48 feet; All laborers working inside a sphere or any type or make of tank; Working inside a sphere or any type or make of tank from bottom to a height of 48 feet; Form strippers (any type); Mechanical or motorized buggies, for concrete or masons employers; Use of skid steer loads or any other machinery which replaces the wheelbarrow or buggy; Handling multiple concrete duct or any other type of pipe used in public utility work unless otherwise specified herein; Snapping of wall ties and removal of rods; drilling of anchor bolt holes; Concrete or asphalt clipper type saws and self-propelled saws; Shoulder and grade laborers; All hydraulic electric and air or any other type of tools; Grouting and caulking; Cleaning lumber, Nail pulling, Deck hand; Dredgehand; Shore laborer; Bankmen on Floating Plant; Tool and material checkers; Signalmen and Flagmen on all construction work; Cleaning of debris; Removal of trees; Concrete curing, temporary concrete protection regardless of manner or materials used; Laborers on Apsco; Janitorial; Wrecking and demolition laborers

GROUP 2 - Sewer and drain pipe layers and multiple concrete duct or any other type of pipe used, on public utility work (ground level to 8 feet); Pumpcrete pipe handlers

GROUP 3 - Asphalt rakers; Hod carriers; Plasterer laborers; Gunnite laborers, Slab for setters on roads, highways, streets, airport runaways, and radii (any type of form) stringline men for all aforementioned work; Wagon and tower drillers on land and floating plant used on dredging; Asphalt gunners and plug men (undercoating on road work);

Mortar pump laborers; Plaster pump laborers

GROUP 4 - Tunnel miners, and all laborers inside tunnel; Air blow pipemen; Torchmen (burners); Mortaring men on sewer and drain pipe (the applying of mortar and composition mixes); All bottom men on sewer work-all sewer and drain pipelayers-multiple concrete duct or any other type of pipe used on public utility work-8 feet or more below ground level, and all other sewer and trench laborers 8 feet or more below ground level regardless of excavation area; All labor work inside cofferdam; Use of a 10 foot or more drill steel for hand held drills; Caisson laborers ground level down 15 feet; All air tools 8 feet or more below ground level; All laborers working on swinging-suspended or any type or make of scaffolds, 48 feet to 100 feet; All chimney and silo laborers working at a height of 48 to 100 feet; All tamping hammers over 150 lbs.; All laborers working inside of a sphere or any type or make of tank at a height of 48 feet to 100 feet; all hydraulic, electric and air tools or any other type 8 feet or more below ground level; Vibrators-any type-8 feet or more below ground level

GROUP 5 - Gunnite nozzle men; Caisson laborers and all tamping hammers from 150 lbs and over; from 15 feet below ground level down to 50 feet; and all laborers working inside of a sphere or any type of tank for every additional 50 feet or part thereof above 100 feet in height

GROUP 6 - All underground cavern laborers; Caisson laborers 50 feet or more below ground level; Laborers working under radio active conditions (suiting up); Blasting men (Powdermen)

GROUP 7 - Dosimeter (any device) used for monitoring nuclear exposure; Asbestos abatement worker; Toxic and hazardous waste removal laborer; and chimney and silo laborers for every additional 50 feet or any part thereof above 100 feet high

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LABO0149-001 06/01/2011

KANE, KENDALL, AND McHENRY COUNTIES

	Rates	Fringes
LABORER		
GROUP 1	$ 35.20	21.45
GROUP 2	$ 35.30	21.45
GROUP 3	$ 35.35	21.45
GROUP 4	$ 35.20	21.45
GROUP 5	$ 35.45	21.45
GROUP 6	$ 35.55	21.45
GROUP 7	$ 35.70	21.45
GROUP 8	$ 36.20	21.45

LABORER CLASSIFICATIONS

GROUP 1 Common Laborer

GROUP 2 Power Vibrator

GROUP 3 Torchman (demolition only), Mortarmen

GROUP 4 Power Tamper

GROUP 5 Jackhammer & Airspade; Chainsaw, Swinging Stage and Boatswain Chair; Cement Gun Nozzleman; Hod Carrier; Plasterer Tender, and Tunnel Man

GROUP 6 Tile Layers; Bottom Men

GROUP 7 Caisson Laborers; Dynamiters

GROUP 8 Asbestos abatement laborers, Toxic and hazardous waste removal laborers, Dosimeter (any device) monitoring nuclear exposure

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* LABO0152-001 06/01/2011

LAKE COUNTY

	Rates	Fringes
LABORER		
GROUP 1	$ 35.20	21.45
GROUP 2	$ 35.275	21.45
GROUP 3	$ 35.30	21.45
GROUP 4	$ 35.35	21.45
GROUP 5	$ 35.40	21.45
GROUP 6	$ 35.425	21.45
GROUP 7	$ 35.525	21.45
GROUP 8	$ 35.55	21.45
GROUP 9	$ 35.35	21.45
GROUP 10	$ 35.65	21.45
GROUP 11	$ 36.20	21.45

LABORER CLASSIFICATIONS

GROUP 1: Building laborers; Plasterer tenders, General laborers (wrecking and demolition); Fireproofing and fire shop laborers

GROUP 2: Cement gun laborers and hose

GROUP 3: Chimney over 40 feet; Scaffold laborers; Wall men or wreckers

GROUP 4: Cement Gun nozzle (gunite) laborers

GROUP 5: Stone derrickmen and handlers

GROUP 6: Jackhammermen (tampers & vibrators); Power driven concrete saws

GROUP 7: Firebrick & boiler laborer setters

GROUP 8: Chimney laborers (on fire brick); Caisson Diggers; Well Point system men

GROUP 9: Windlass and capstan persons

GROUP 10: Boiler setter plastic laborers

GROUP 11: Dosimeter (any device) monitoring nuclear exposure; Asbestos abatement laborers; Toxic and hazardous waste removal laborers

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PAIN0014-002 06/01/2011

GRUNDY, LAKE, and WILL COUNTIES

	Rates	Fringes
PAINTER		
Brush, Decorator, and Paperhanger	$ 38.00	21.62

PAIN0027-003 06/01/2010

	Rates	Fringes
GLAZIER	$ 38.00	24.62

PAIN0030-001 05/01/2011

DUPAGE, KANE, KENDALL, AND MCHENRY COUNTIES

	Rates	Fringes
PAINTER		
Brush, Drywall Taper/Finisher, Sandblaster, and Spray	$ 40.18	18.40

PLAS0005-003 07/01/2011

GRUNDY and WILL COUNTIES

	Rates	Fringes
PLASTERER	$ 39.25	21.84

PLAS0005-006 07/01/2011

DU PAGE COUNTY

	Rates	Fringes
PLASTERER	$ 39.25	21.84

PLAS0011-008 06/01/2011

DE KALB, KANE, KENDALL, AND McHENRY COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 41.55	22.01

PLAS0011-012 08/01/2010

GRUNDY AND WILL COUNTIES

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 41.00	21.03

PLAS0011-014 06/01/2011

LAKE COUNTY

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 40.30	23.28

PLASTERER.....$ 38.69 23.43

PLAS0803-002 08/01/2010

DUPAGE COUNTY

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	$ 38.00	24.03

PLUM0093-001 06/01/2011

LAKE and McHENRY COUNTIES

	Rates	Fringes
PLUMBER.....	$ 44.50	25.25

PLUM0130-002 06/01/2011

DUPAGE (Argonne National Laboratories and Fermi National Laboratory), GRUNDY & WILL COUNTIES

	Rates	Fringes
PLUMBER.....	$ 44.75	21.53

PLUM0501-001 01/01/2012

DUPAGE (excluding Argonne National Laboratory and Fermi National Laboratory), KANE, and KENDALL (except the Mich-Wis Pumping Station in Milbrook, Silicas and Plant and Village of Newark, excludes Yorkville) COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER.....	$ 41.00	27.10

PLUM0597-001 06/01/2011

DUPAGE (Argonne National Laboratories, and Fermi National Laboratory), GRUNDY, LAKE, MCHENRY & WILL COUNTIES

	Rates	Fringes
PIPEFITTER.....	$ 44.05	24.13

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* ROOF0011-004 06/01/2011

DUPAGE, KANE, KENDALL, LAKE, MCHENRY, and WILL COUNTIES

	Rates	Fringes
ROOFER.....	$ 37.65	16.25

ROOF0011-009 06/01/2010

	Rates	Fringes
ROOFER.....	$ 29.56	14.75

SFIL0281-002 01/01/2012

DuPAGE, KANE, KENDALL, LAKE, McHENRY, and WILL COUNTIES

	Rates	Fringes
SPRINKLER FITTER	$ 47.80	18.50

SHEE0073-003 06/01/2011

LAKE COUNTY

	Rates	Fringes
Sheet metal worker	$ 40.56	27.23

SHEE0073-004 06/01/2011

LAKE COUNTY

	Rates	Fringes
Sheet Metal Worker		
ALUMINUM GUTTER WORK	$ 27.63	27.23

SHEE0265-001 06/01/2011

DU PAGE, GRUNDY, KANE, KENDALL, McHENRY, and WILL COUNTIES

	Rates	Fringes
SHEET METAL WORKER	$ 41.66	23.95

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* TEAM0179-001 06/01/2011

GRUNDY, KENDALL, and WILL COUNTIES

	Rates	Fringes
TRUCK DRIVER		
2 or 3 Axle Trucks	$ 35.65	7.25+a
4 Axle Trucks	$ 35.80	7.25+a
5 Axle Trucks	$ 36.00	7.25+a
6 Axle Trucks	$ 36.20	7.25+a
All Lowboy Trucks	$ 37.20	7.25+a

FOOTNOTE: a. $229.80 per week.

FOOTNOTE: An additional $.20 per axle shall be paid for all vehicles with more than six (6) axles.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or 3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen

and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long;
Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicels, such as mounted crane tucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

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* TEAM0301-001 06/01/2011

LAKE AND MCHENRY COUNTIES

	Rates	Fringes
TRUCK DRIVER		
2-3 AXLES	$ 35.85	.15+a
4 AXLES	$ 36.00	.15+a
5 AXLES	$ 36.20	.15+a
6 AXLES	$ 36.40	.15+a

FOOTNOTE: a. $288.00 per week health and welfare
$240.00 per week pension

An additional $.20 per axle shall be paid for all vehicles with more than six (6) axles.

Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

900 straight time hours or more in 1 calendar year for the same employer shall receive 1 week paid vacation; 3 years - 2 weeks paid vacation; 10 years - 3 weeks paid vacation; 20 years - 4 weeks paid vacation.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes; Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors,

two-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or 3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long;
Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicels, such as mounted crane tucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

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* TEAM0673-003 06/01/2008

DU PAGE and KANE COUNTIES

	Rates	Fringes
TRUCK DRIVER		
2-3 AXLES	$ 32.55	.15+a
4 AXLES	$ 32.70	.15+a
5 AXLES	$ 32.90	.15+a
6 AXLES	$ 33.10	.15+a

FOOTNOTE: a. $434.00 per week.

An additional $.20 per axle shall be paid for all vehicles with more than six (6) axles.

Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

900 straight time hours or more in 1 calendar year for the same employer shall receive 1 week paid vacation; 3 years - 2 weeks paid vacation; 10 years - 3 weeks paid vacation; 20 years - 4 weeks paid vacation.

CLASSIFICATIONS:

Group 1 - Frame Truck when used for transportation purposes;

Air Compressor and Welding Machines, including those pulled by cars, pick-up trucks and tractors; Ambulances; Articulated Dumps; Batch Gate Lockers; Batch Hopperman; Car and Truck Washers; Carry Alls; Forl Lifts and Hoisters; Helpers; Mechanics Helpers and Greasers; Oil Distributors, two-man operation; Pavement Breakers; Pole Trailer, up to 40 feet; Pothole Repair Trucks; Power Mower Tractors; Quick Change Barrier; Self-Propelled Chip Spreader; Shipping and Receiving Clerks and Checkers; Skipman; Slurry Trucks, two-man operation; Slurry Trucks, Conveyor Operated - 2 or 3 man operation; Teamsters; Unskilled Dumpmen; Warehousemen and Dockmen; Truck Drivers hauling warning lights, barricades, and portable toilets on the job site

Group 2 - Dispatcher; Dump Crets and Adgetators under 7 yards; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment under 16 cubic yards; Mixer Trucks under 7 yards; Ready-Mix Plant Hopper Operator; Winch Trucks, 2 Axles

Group 3 - Dump Crets and Adgetators, 7 yards and over; Dumpsters, Track Trucks, Euclids, Hug Bottom Dump Turnapulls or Turnatrailers when pulling other than self-loading equipment or similar equipment over 16 cubic yards; Explosives and/or Fission Material Trucks; Mixer Trucks 7 yards or over; Mobile Cranes while in transit; Oil Distributors, one-man operation; Pole Trailer, over 40 feet; Pole and Expandable Trailers hauling material over 50 feet long;
Slurry Trucks, one-man operation; Winch Trucks, 3 axles or more; Mechanic - *Truck Welder and *Truck Painter*These classifications shall only apply in areas where and when it has been a past area practice; Asphalt Plant Operators in areas where it has been past practice

Group 4 - Dual-purpose vehicels, such as mounted crane tucks with hoist and accessories; Foreman; Master Mechanic; Self-loading equipment like P.B. and trucks with scoops on the front

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rate.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division

U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

PERFORMANCE BOND *(See instructions on reverse)*	DATE BOND EXECUTED *(Must be same or later than date of contract)*	OMB No.: **9000-0045** Expires: 11/30/2012

Public reporting burden for this collection of information is estimated to average 25 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the FAR Secretariat (MVR), Federal Acquisition Policy Division, GSA, Washington, DC 20405

PRINCIPAL *(Legal name and business address)*	TYPE OF ORGANIZATION ("X" one) ☐ INDIVIDUAL ☐ PARTNERSHIP ☐ JOINT VENTURE ☐ CORPORATION STATE OF INCORPORATION
SURETY(IES) *(Name(s) and business address(es)*	PENAL SUM OF BOND MILLION(S) / THOUSANDS / HUNDRED(S) / CENTS CONTRACT DATE / CONTRACT NO.

OBLIGATION

We, the Principal and Surety (ies), are firmly bound to the Unites States of America (hereinafter called the Government) in the above penal sum. For payment of the penal sum, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally. However, where the Sureties are corporations acting as co-sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action against any or all of us. for all other purposes, each Surety binds itself, jointly and severally with the Principal, for the payment of the sum shown opposite the name of the Surety. If no limit of liability is indicated, the limit of liability is the full amount of the penal sum.

CONDITIONS

The Principal has entered into the contract identified above.

THEREFORE

The above obligation is void if the Principal-

(a)(1) Performs and fulfills all the undertaking, covenants, terms, conditions, and agreements of the contract during the original term of the contract and any extensions thereof that are granted by the Government, with or without notice of the Surety(ies) and during the life of any guaranty required under the contract, and (2) performs and fulfills all the undertakings, covenants, terms conditions, and agreements of any and all duly authorized modifications of the contract that hereafter are made. Notice of those modifications to the Surety(ies) are waived.

(b) Pays to the Government the full amount of the taxes imposed by the Government, if the said contracts is subject to the Miller Act, (40 U.S.C. 270a-270e), which are collected, deducted, or withheld from wages paid by the Principal in carrying out the construction contract with respect to which this bond is furnished.

WITNESS

The Principal and Surety(ies) executed this performance bond and affixed their seals on the above date.

PRINCIPAL

SIGNATURE(S)	1. (Seal)	2. (Seal)	3. (Seal)	Corporate Seal
NAME(S) & TITLE(S) *(Typed)*	1.	2.	3.	

INDIVIDUAL SURETY(IES)

SIGNATURE(S)	1. (Seal)	2. (Seal)
NAME(S) *(Typed)*	1.	2.

CORPORATE SURETY(IES)

SURETY A	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S *(Typed)*	1.	2.		

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STANDARD FORM 25 (REV. 5-96)
Prescribed by GSA-FAR (48 CFR) 53.228 (b)

CORPORATE SURETY(IES) *(Continued)*

SURETY B	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY C	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY D	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY E	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY F	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		
SURETY G	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT ($)	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		

BOND PREMIUM ▶	RATE PER THOUSAND ($)	TOTAL ($)

INSTRUCTIONS

1. This form is authorized for use in connection with Government contracts. Any deviation from this form will require the written approval of the Administrator of General Services.

2. Insert the full legal name and business address of the Principal in the space designated "Principal" on the face of the form. An authorized person shall sign the bond. Any person signing in a representative capacity (e.g., and attorney-in-fact) must furnish evidence of authority if that representative is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved.

3. (a) Corporations executing the bond as sureties must appear on the department of the Treasury's list of approved sureties and must act within the limitation listen therein. Where more than one corporate surety is involved, their names and addresses shall appear in the spaces (Surety A, Surety B, etc.) headed "CORPORATE SURETY(IES)." In the space designated "SURETY(IES)" on the face of the form, insert only the letter identification of the sureties.

(b) Where individual sureties are involved, a completed Affidavit of Individual Surety (standard Form 28) for each individual surety, shall accompany the bond. The Government may require the surety to furnish additional substantiating information concerning their financial capability.

4. Corporation executing the bond shall affix their corporate seals. Individual shall execute the bond opposite the word " Corporate Seal", and shall affix an adhesive seal if executed in Maine, New Hampshire, or any other jurisdiction requiring adhesive seals.

5. Type the name and title of each person signing this bond in the space provided.

PAYMENT BOND *(See instructions on reverse)*	DATE BOND EXECUTED *(Must be same or later than date of contract)*	OMB No.:**9000-0045** Expires: 11/30/2012

PRINCIPAL *(Legal name and business address)*	TYPE OF ORGANIZATION *("X" one)* ☐ INDIVIDUAL ☐ PARTNERSHIP ☐ JOINT VENTURE ☐ CORPORATION STATE OF INCORPORATION
SURETY(IES) *(Name(s) and business address(es))*	PENAL SUM OF BOND MILLION(S) | THOUSAND(S) | HUNDRED(S) | CENTS CONTRACT DATE | CONTRACT NO.

OBLIGATION:

We, the Principal and Surety(ies), are firmly bound to the United States of America (hereinafter called the Government) in the above penal sum. for payment of the penal sum, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally. However, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" as well as "severally" only for the purpose of allowing a joint action or actions against any or all of us. For all other purposes, each Surety binds itself, jointly and severally with the Principal, for the payment of the sum shown opposite the name of the Surety. If no limit is indicated, the limit of liability is the full amount of the penal sum.

CONDITIONS:

The above obligation is void if the Principal promptly makes payment to all persons having a direct relationship with the Principal or a subcontractor of the Principal for furnishing labor, material or both in the prosecution of the work provided for in the contract identified above, and any authorized modifications of the contract that subsequently are made. Notice of those modifications to the Surety(ies) are waived.

WITNESS:

The Principal and Surety(ies) executed this payment bond and affixed their seals on the above date.

PRINCIPAL				
SIGNATURE(S)	1. (Seal)	2. (Seal)	3. (Seal)	Corporate Seal
NAME(S) & TITLE(S) *(Typed)*	1.	2.	3.	

INDIVIDUAL SURETY(IES)		
SIGNATURE(S)	1. (Seal)	2. (Seal)
NAME(S) *(Typed)*	1.	2.

CORPORATE SURETY(IES)					
SURETY A	NAME & ADDRESS		STATE OF INC.	LIABILITY LIMIT $	Corporate Seal
	SIGNATURE(S)	1.	2.		
	NAME(S) & TITLE(S) *(Typed)*	1.	2.		

DEPARTMENT OF TRANSPORTATION
CONTRACTOR'S RELEASE

CONTRACTOR (Name and Address)	**ENTER SUM OF TOTAL OF AMOUNTS PAID AND PAYABLE**
CONTRACT NO.	**$**

Pursuant to the terms of the above numbered contract and in consideration of the sum stated above, which has been paid or is to be paid to the Contractor, or its assignees, the Contractor, upon payment of the said sum by the UNITED STATES OF AMERICA (hereinafter called the Government), does remise, release, and discharge the Government, its officers, agents, and employees, of and from all liabilities, obligations, claims, and demands whatsoever under or arising from the said contract, except:

1. Specified claims in stated amounts or in estimated amounts where the amounts are not susceptible of exact statement by the Contractor, as follows: (or state "None")

2. Claims, together with reasonable expenses incidental thereto, based upon the liabilities of the Contractor to third parties arising out of the performance of this contract, which are not known to the Contractor on the date of the execution of this release and of which the Contractor gives notice in writing to the Contracting Officer within the period specified in the said contract; and

3. Claims for reimbursement of costs (other than expenses of the Contractor by reason of his indemnification of the Government against patent liability) including reasonable expenses incidental thereto, incurred by the Contractor under any provisions of the said contract relating to patents.

The Contractor agrees, in connection with patent matters and with claims which are not released as set forth above, that it will comply with all provisions of the said contract, provisions of the said contract, including without limitation those provisions relating to notification to the Contracting Officer and relating to the defense or prosecution of litigation.

IN WITNESSES WHEREOF, this release has been executed this _____ day of _____, 19 ___.

WITNESSES

_____ (Contractor)

_____ BY _____

_____ TITLE _____

NOTE: In the case of a corporation, witnesses are not required but the below statement must be completed.

I, _____, am the _____ secretary of the corporation named as Contractor in the foregoing release; that _____ who signed said release on behalf of the Contractor was then _____ of said corporation; release was duly signed for and in behalf of said corporation by authority of its governing body and is within the scope of its corporate powers.

_____
Signature